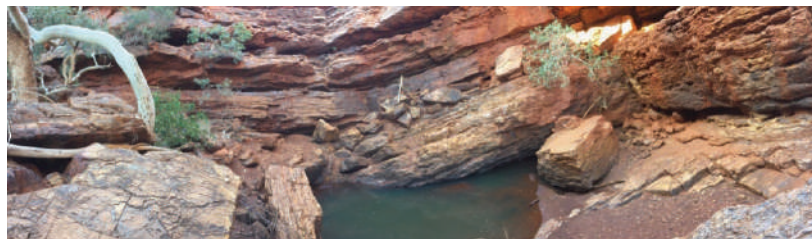




Brockman Syncline 4 Marra Mambas Level 2 Fauna Survey



Prepared for Rio Tinto

January 2016



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ABN 49 092 687 119
Level 1, 228 Carr Place
Leederville Western Australia 6007
Ph: (08) 9328 1900 Fax: (08) 9328 6138

Job No.: 1122B

Prepared by: N. Watson

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BS4 Marra Mambas Fauna Survey

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1.0 Executive Summary

1.1 Introduction

Rio Tinto's Brockman Syncline 4 (BS4) Iron Ore Mine is located 60 km northwest of the town of Tom Price in the Pilbara, Western Australia. The company is currently undertaking studies for development of a Marra Mamba ore body located southeast of, and parallel to, the main BS4 mining area. Rio Tinto has identified an area of 5,806 ha to encompass any potential mine and infrastructure associated with the prospective development (hereafter referred to as the "study area").

Numerous fauna surveys had been conducted in the locality prior to 2015, several of which overlapped the study area, however 2,436 ha had not previously been surveyed to a Level 2 standard. In order to meet Environmental Impact Assessment requirements, further work was necessary to ensure that the entire study area was assessed to a Level 2 standard.

Biota Environmental Sciences (Biota) was commissioned to conduct a single season Level 2 terrestrial fauna survey of the previously unsurveyed section of the BS4 Marra Mambas ore body study area (the "survey area"). The resulting report was to include both new and historical fauna records and fauna habitat information for the entire study area.

1.2 Methodology

The field survey was conducted over an 11-day period from 30th July to 9th August 2015. It was completed in accordance with relevant Environmental Protection Authority policy and guidance statements, as well as the requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Systematic sampling effort included:

- Elliott/cage trapping at three locations for seven nights;
- pitfall trapping at five locations for seven nights;
- funnel trapping at two locations for seven nights;
- multiple avifauna censuses at nine locations;
- deployment of SM2BAT SongMeter echolocation call recorders at five locations for a total of 15 nights;
- deployment of remote motion sensitive cameras at eight locations for a total of 23 nights; and
- a total of almost 18 person hours dedicated to SRE fauna searches at 11 sites within the study area.

Non-systematic survey activities targeting vertebrate fauna included identification of secondary signs such as tracks, scats, burrows, and skin sloughs.

Fauna records from historical sampling sites within the study area were consolidated with the 2015 records from the survey area to create a species list for the study area as a whole.

1.3 Desktop Assessment

A comprehensive list of vertebrate species that may potentially occur within the study area was compiled using data from searches of the NatureMap, EPBC Act and Atlas of Living Australia databases. Fauna found to potentially occur within the locality of the study area included 141 bird species, 92 reptile species, 43 mammal species and four amphibians. Of these, 19 species are of State and/or Commonwealth conservation significance.

A search of the WAM Arachnid and Myriapod, and Land Snail databases returned a total of 56 taxa that belong to families that contain SRE fauna. This total comprised 16 land snail species, 22 mygalomorph spider species, five millipede species, six pseudoscorpion species, one centipede species and six scorpion species.

1.4 Results

1.4.1 Vertebrate Fauna

The current survey recorded a total of 100 vertebrate fauna species, comprising 11 ground-dwelling mammal species, nine bat species, 49 bird species, 30 reptile species and one amphibian species. With the inclusion of records from previous surveys conducted within the study area, a total of 133 vertebrate fauna species have been recorded from the study area to date.

Five of these species are listed as being of conservation significance under Commonwealth and/or WA legislation:

- Pilbara Leaf-nosed Bat, *Rhinonicteris aurantia* (Schedule 3, Vulnerable);
- Ghost Bat, *Macroderma gigas* (Schedule 3, Vulnerable);
- Western Pebble-mound Mouse, *Pseudomys chapmani* (Priority 4);
- Rainbow Bee-eater, *Merops ornatus* (Schedule 5, Migratory); and
- Fork-tailed Swift, *Apus pacificus* (Schedule 5; Migratory).

Of the above species recorded, the Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) is listed as Vulnerable under the Commonwealth EPBC Act and constitutes a Matter of National Environmental Significance (MNES),

Additionally, the MNES Pilbara Olive Python (*Liasis olivaceus barroni*) is considered likely to occur within the study area based on the presence of suitable habitat and previous records in the locality.

Landform features present within the study area that are likely to support MNES fauna by providing habitats suitable for roosting or foraging activities include gorges, gullies, free faces and waterholes.

1.4.2 SRE Invertebrate Fauna

A total of 41 invertebrate specimens were recorded during the survey, comprising three Nemesiid and one Barychelid mygalomorph spider specimens, and 37 live snails of the genus *Rhagada*.

Short-range endemism is common in both of the recorded families of mygalomorph spider (Barychelidae and Nemesiidae), as well as in the land snail genus *Rhagada*. On this basis, and without any molecular sequencing to provide further resolution, all recorded taxa are currently considered to represent potential SREs.

2.0 Introduction

2.1 Project Background

Rio Tinto's BS4 Iron Ore Mine is located 60 km northwest of the town of Tom Price in the Pilbara, Western Australia. The company is currently undertaking studies for development of a Marra Mamba ore body located southeast of, and parallel to, the main BS4 mining area. Rio Tinto has identified an area of 5,806 ha to encompass any potential mine and infrastructure associated with the prospective development (the "study area"; see Figure 2.1).

Numerous fauna surveys had been conducted in the locality prior to 2015, several of which overlapped the study area, however sections of the prospective development area totaling 2,436 ha had not previously been surveyed to a Level 2 standard. In order to meet Environmental Impact Assessment (EIA) requirements, additional fauna survey work was necessary to ensure that the areas that had not previously been surveyed were assessed to a Level 2 standard.

To this end, Biota Environmental Sciences (Biota) was commissioned to conduct a single season, Level 2 terrestrial fauna survey of the previously un-surveyed section of the BS4 Marra Mambas ore body study area (the "survey area"; see Figure 2.1). The resulting report was required to encompass all fauna records and fauna habitat information, both new and historical, for the entire study area.

2.2 Study Scope and Objectives

The scope of the study was to undertake a single-phase Level 2 vertebrate fauna survey of the survey area and to consolidate the results with existing data from the study area.

The key objectives of the study were to:

- document the vertebrate and SRE invertebrate fauna assemblage within the survey area using established sampling techniques;
- consolidate and review existing data and other literature relevant to the broader study area;
- identify fauna species or communities of conservation significance (particularly Schedule and Priority listed species); and
- identify and assess the local and regional conservation significance of fauna habitats, species and assemblages.

In accordance with the Rio Tinto scope of work, Table 2.1 presents a summary of particular information for the survey.

Table 2.1: Summary information for the 2015 survey at BS4 Marra Mambas.

Level of Survey	Survey Area Size	Survey Timing	Relevant Regulatory Guidance Documents and Applicable Legislation	Key Survey Limitations
Single-phase Level 2 vertebrate and SRE fauna survey	2,436 ha	30 th July – 9 th August 2015	<ul style="list-style-type: none"> • Environmental Protection Authority (EPA) Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002) • EPA Guidance Statement No. 56: Terrestrial Fauna Surveys for EIA in Western Australia (EPA 2004) • EPA Guidance Statement No. 20: Sampling of SRE Invertebrate Fauna for EIA in Western Australia (EPA 2009) • EPA and Department of Environment and Conservation (DEC) Technical Guide: Terrestrial Vertebrate Fauna Surveys for EIA (EPA and DEC 2010) • WA <i>Wildlife Conservation Act 1950</i> • Commonwealth EPBC Act 	<ul style="list-style-type: none"> • Single-phase survey, conducted in winter • No molecular work completed for potential SRE fauna specimens

2.3 Purpose of this Report

This report presents the methodology, results and findings of the 2015 single phase, Level 2 terrestrial fauna survey of the 2,436 ha survey area. It also consolidates information from previous fauna survey work conducted within the study area, and provides an assessment of the vertebrate fauna habitats, assemblages and species recorded.

The primary purpose of this report is to highlight potential conservation issues that may require specific consideration or management measures. Its intended use is as a supporting document for the EIA of the proposed BS4 Marra Mambas development. Both the survey and report are subject to specific limitations that are discussed in detail in Section 3.6.

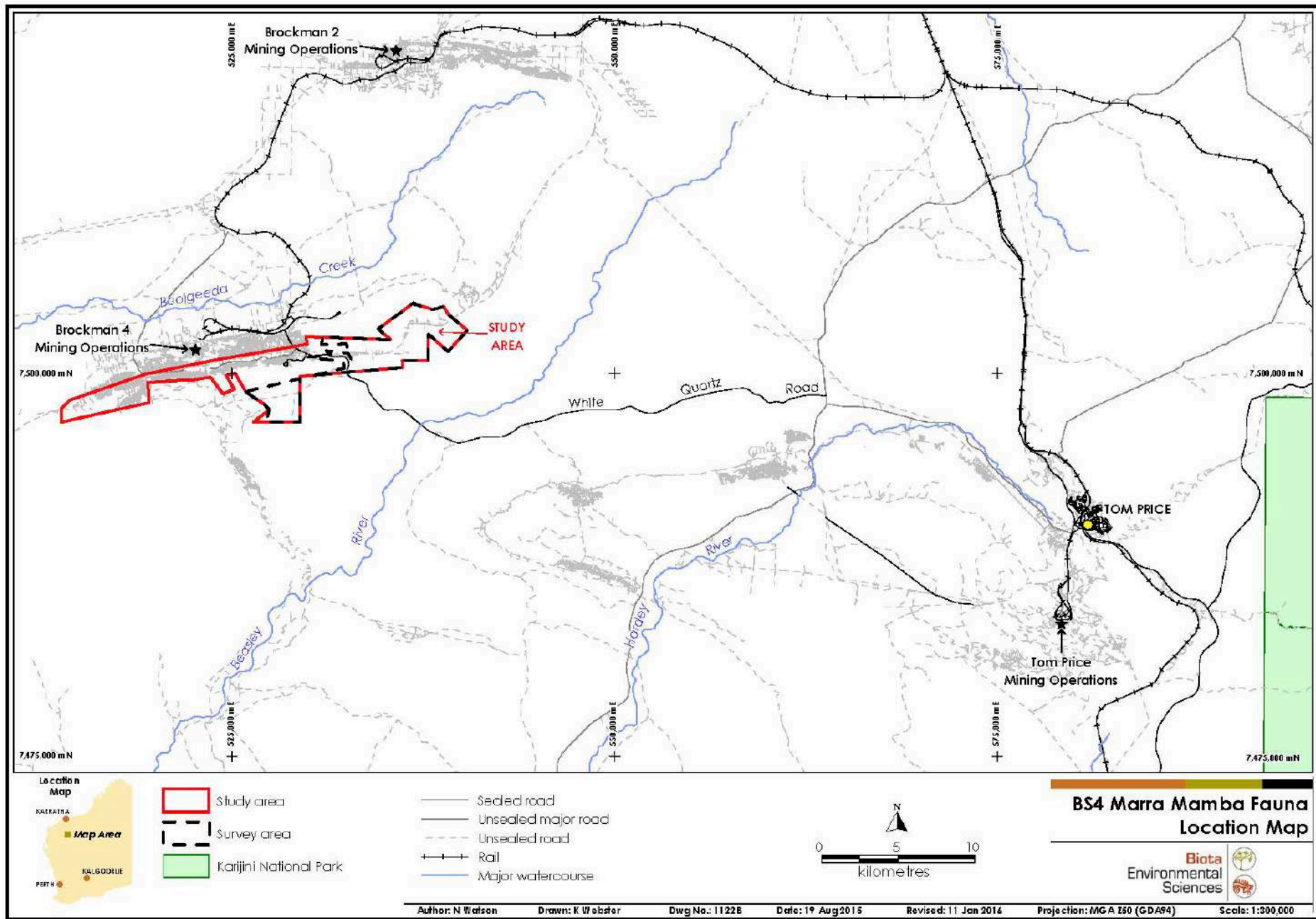


Figure 2.1: Location of the study area.

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3.0 Methodology

3.1 Desktop Assessment

A desktop assessment was undertaken to identify relevant records of fauna species of conservation significance, as well as habitats that may support them, within the study area and wider locality (defined here as within 40 km of the study area). The desktop assessment considered the results of various database searches (Section 3.1.1) and previous fauna surveys in the locality (Section 3.1.2), as well as other publicly available information. The review of aerial imagery, land systems, geology and vegetation detailed in Section 4.0 was also used to inform site selection for the field survey component (see Section 3.3).

3.1.1 Database Searches

The following databases were searched to assist with compilation of a list of fauna species potentially occurring in the study area:

1. **NatureMap:** a collaboration between the Department of Parks and Wildlife and the Western Australian Museum (WAM). This database represents the most comprehensive source of information on the distribution of Western Australia's fauna, comprising records from the Fauna Survey Returns database and WA Threatened Fauna Database (both managed by the Department of Parks and Wildlife), the WAM Specimen Database, and the BirdLife Australia Atlas. The database search (Appendix 1) was conducted on 21st July 2015 and requested the return of records from a radius of 40 km from an approximate central point within the study area (527578 mE, 7500272 mN¹).
2. **Atlas of Living Australia:** a collaborative project between academic collecting institutions, private individual collectors and community groups. The atlas contains occurrence records, environmental data, images and the conservation status of species throughout Australia. The database search (Appendix 1) was conducted on 21st July 2015 and requested the return of records from a radius of 40 km from the approximate central point of 527578 mE, 7500272 mN.
3. **EPBC Act Protected Matters:** this database was searched to identify fauna species listed as Matters of National Environmental Significance (MNES) that may occur in the study area locality. The search was conducted on 21st July 2015 and requested the return of records from a radius of 40 km from the approximate central point of 527578 mE, 7500272 mN (Appendix 1).
4. **WAM's Arachnid and Myriapod database:** a search for records of SRE invertebrate fauna in these groups (i.e. spiders, scorpions, pseudoscorpions, centipedes and millipedes) was requested from the WAM on the 21st July 2015 using a search locality bounded by the following coordinates: 473800 mE, 7544600 mN (northwest) and 580250 mE, 7456800 mN (southeast) (Appendix 1).
5. **WAM's Mollusc database:** a search for records of SRE invertebrate fauna in this group (i.e. land snails and aquatic snails) was requested from the WAM on 21st July 2015 using a search locality bounded by the following coordinates: 473800 mE, 7544600 mN (northwest) and 580250 mE, 7456800 mN (southeast) (Appendix 1).

3.1.2 Review of Previous Studies

Fourteen fauna surveys have been conducted in the locality of the Marra Mambas study area, the records from which were compiled through the NatureMap search (Section 3.1.1). Six of these surveys directly overlapped sections of the study area, and the fauna records from these that were relevant to the study area were collated (see Section 4.7).

¹ All coordinates presented in this report are in WGS84 datum, zone 50K.

² The Cheela Plains station opened relatively recently (in 2002), and this was not considered to provide a

3.1.3 Assessment of Likelihood of Occurrence in the Study Area

In order to determine which vertebrate fauna species of conservation significance have the potential to occur in the study area, consideration was given to the results of the database and literature searches, as well as taking into account the date of last known records, distributions and the availability of preferred habitat within the study area. For each species considered, a set of rankings and criteria was applied to assess the likelihood of occurrence within the study area (see Table 3.1). It should be noted that detection of occupancy is based on current approaches and typical sampling effort. In some instances these methods of detection may not be adequate to target inconspicuous species, and the criterion of 'unlikely to occur' should therefore be accepted with caution. The likelihood rankings were assigned following the desktop review (see Section 4.7.2.1), and were re-evaluated once the findings of the field survey were available (Section 6.0).

Table 3.1: Ranking system used to assign the likelihood that a species would occur in the study area.

Rank	Criteria
Recorded	1. The species has been previously recorded in the study area.
Likely to occur	1. There are existing records of the species in proximity to the study area (within 20 km); and <ul style="list-style-type: none"> • the species is strongly linked to a specific habitat, which is present in the study area; or • the species has more general habitat preferences, and suitable habitat is present.
May potentially occur	1. There are existing records of the species from the locality (within 40 km), however <ul style="list-style-type: none"> • the species is strongly linked to a specific habitat, of which only a small amount is present in the study area; or • the species has more general habitat preferences, but only some suitable habitat is present. 2. There is suitable habitat in the study area, but the species is recorded infrequently in the locality.
Unlikely to occur	1. The species is linked to a specific habitat, which is absent from the study area; or 2. Suitable habitat is present, however there are no existing records of the species from the locality despite reasonable previous search effort in suitable habitat; or 3. There is some suitable habitat in the study area, however the species is very infrequently recorded in the locality.
Would not occur	1. The species is strongly linked to a specific habitat, which is absent from the study area; and/or 2. The species' range is very restricted and does not include the study area.

3.2 Survey Team, Timing, Weather and Climate

3.2.1 Survey Team and Timing

The survey was conducted over an 11-day period from 30th July to 9th August 2015 under "Licence to Take Fauna for Scientific Purposes" No. SF010431 issued to Mr Dan Kamien (Appendix 2). The field survey team comprised Dr Nicola Watson and Mr Michael Greenham (both of Biota). Field assistance was provided by Mr Jason Alexander, Mr Michael Delaney and Mr Justin Fairhead (all of Biota) for the site installation (30th July to 2nd August).

Analysis of bat echolocation calls was completed by Mr Bob Bullen of Bat Call WA (Appendix 3).

3.2.2 Weather Observations

Daily temperatures and rainfall received during the survey are summarised in Table 3.2. This information was sourced from the closest Bureau of Meteorology stations recording the relevant data: Paraburdoo Aero (station 7185, approximately 75 km southeast of the survey area) for temperature, and Cheela Plains (station 5095, 44 km southwest) for rainfall.

The weather during the survey period was warm, with maximum temperatures at Paraburdoo Aero ranging from 24.1°C to 30.7°C and minimum temperatures ranging from 8°C to 15.1°C (Table 3.2). No rainfall was recorded at Cheela Plains during the survey (Table 3.2).

Table 3.2: Daily temperatures and rainfall recorded at Paraburdoo Aero and Cheela Plains respectively over the 2015 survey period.

	July		August									Mean/ Total
	30 th	31 st	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	
Minimum Temperature (°C)	14.3	13.0	15.1	10.9	13.9	12.1	10.1	10.0	8.0	9.1	8.0	11.3
Maximum Temperature (°C)	30.7	29.6	25.1	26.2	25.5	25.2	25.7	25.5	26.9	25.9	24.1	26.4
Rainfall (mm)	0	0	0	0	0	0	0	0	0	0	0	0

(Data sourced from the WA Bureau of Meteorology.)

3.2.3 Climatological Data

Long-term climatological data (rainfall data from 1974-2015, temperature data from 1966-2015) were obtained from the Bureau of Meteorology Paraburdoo Aero station (7185)².

Figure 3.1 illustrates the average monthly minimum and maximum temperatures and rainfall for the year preceding the survey, compared with the long-term averages. In the year preceding the survey, the maximum temperatures were higher than average for all months with the exception of March, April and May. Minimum temperatures in the year preceding the survey were similarly slightly above average for most months. The study area received higher than the average total annual rainfall in the year preceding the survey (138%), with considerably above-average precipitation recorded for the months of March and May.

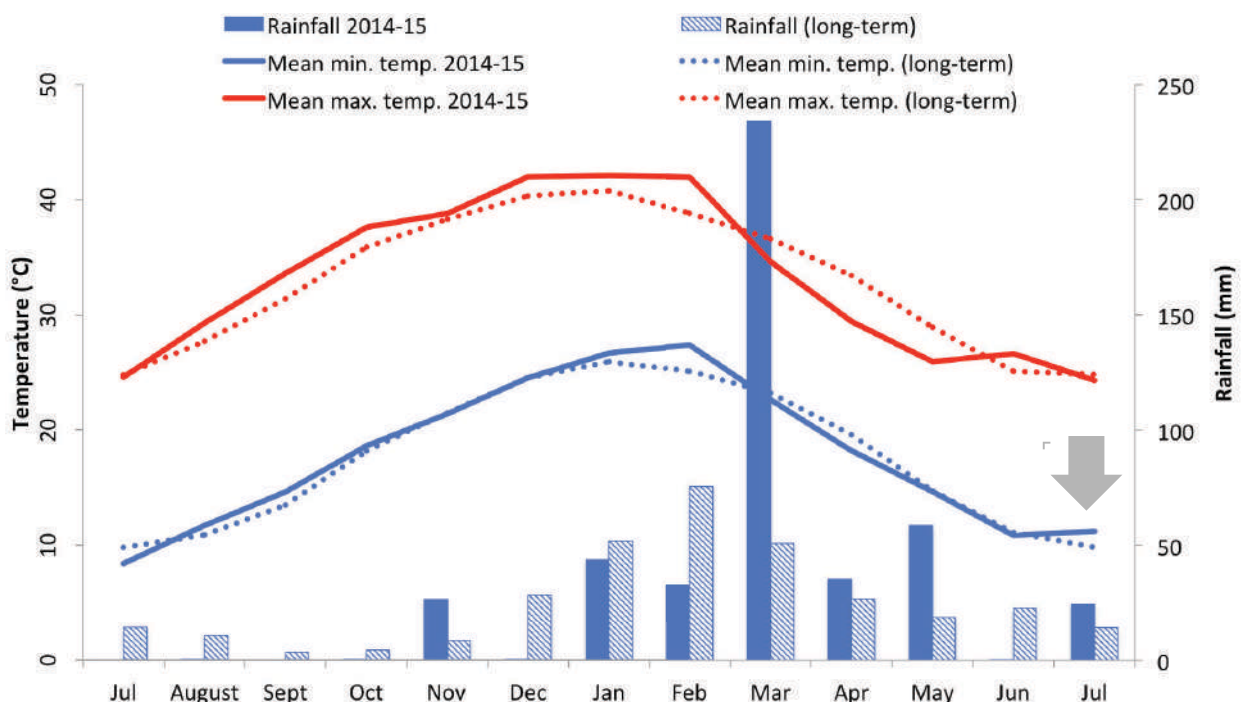


Figure 3.1: Climate graph depicting long-term averages and 2014/15 data for Paraburdoo Aero. (Long-term temperature data 1966-2015, rainfall data 1974-2015; arrow indicates survey timing.)

² The Cheela Plains station opened relatively recently (in 2002), and this was not considered to provide a sufficiently long period for comparison.

3.3 Fauna Sampling

3.3.1 Site Selection and Fauna Habitat Assessments

The field survey component consisted of a combination of systematic fauna sampling with targeted searches within habitats considered suitable for vertebrate fauna of conservation significance and SRE invertebrate fauna. Preliminary site selection for both vertebrate and SRE sites was determined through assessment of aerial photography and various thematic layers, including land systems, geology, drainage lines, tracks and roads. This facilitated the selection of indicative trapping sites on the basis of broad landform classifications and an assessment of the terrain.

Further habitat assessments were conducted in the field at the sampling sites to incorporate a range of parameters including substrate, vegetation, ground cover, soil type, outcropping and level of disturbance. These assessments were used in conjunction with the vegetation mapping by Biota (2016) to describe and map fauna habitats for the study area (see Section 5.1).

3.3.2 Terrestrial Vertebrates

The systematic trapping component of the fauna survey consisted of 10 trapping transects, each located within a defined landform (Section 5.1). The layout of the transects was as follows:

- Five trapping transects consisted of a single row of 10 pitfall traps, arranged as alternating 20 litre buckets and 150 mm diameter x 600 mm high PVC tubes. These were spaced at approximately 10 m intervals and connected with a 90 m length of 300 mm high flywire fence (see Figure 3.2).
- Three trapping transects utilised cage traps and medium and large Elliott box traps spaced at approximately 10-15 m intervals. Traps were baited with a mixture of peanut butter, oats, bacon and tinned fish.
- Two trapping transects consisted of funnel traps placed in pairs at approximately 10 m intervals adjacent to a 100 m length of 300 mm high flywire fence (see Figure 3.3).

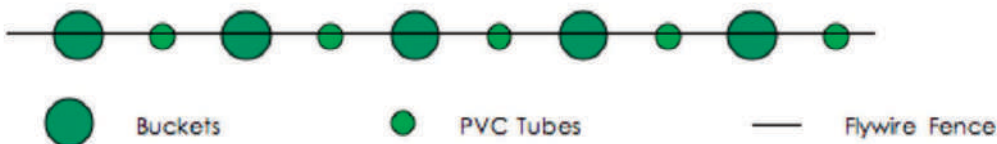


Figure 3.2: Layout of pitfall trapping transects.

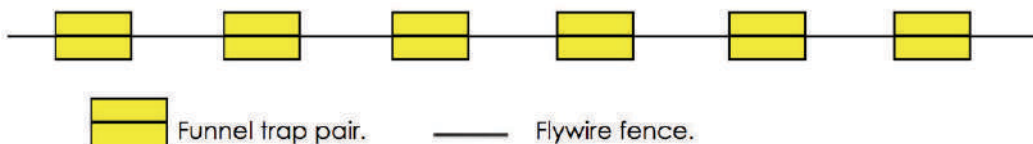


Figure 3.3: Layout of funnel trapping transects.

A summary of trapping effort is provided in Table 3.3 and the location of sites is presented in Figure 3.4. In total, 960 trap days of systematic sampling were completed as part of the 2015 survey. Descriptions of the trapping sites are presented in Table 5.3. Five additional sites that were previously trapped within the study area are shown on Figure 3.4 and discussed in Section 4.7.1.

Table 3.3: Systematic trapping locations and sampling effort.

Site	Trap Type	Easting (mE)	Northing (mN)	Date Opened	Date Closed	Days Opened	Number of Traps	Trap Effort
MAM01P	Pitfall	539111	7503415	01/08/15	08/08/15	7	10	70
MAM02P	Pitfall	534499	7501286	01/08/15	08/08/15	7	10	70
MAM03P	Pitfall	531433	7500114	01/08/15	08/08/15	7	10	70
MAM04P	Pitfall	527180	7498357	01/08/15	08/08/15	7	10	70
MAM05P	Pitfall	528854	7496992	01/08/15	08/08/15	7	10	70
MAM06F	Funnel	529004	7497738	01/08/15	08/08/15	7	20	140
MAM07C	Cage	536775	7503453	05/08/15	08/08/15	3	5	15
MAM07F	Funnel	536777	7503446	01/08/15	08/08/15	7	20	140
MAM08E	Elliott	536620	7502470	02/08/15	09/08/15	7	20	140
MAM09E	Elliott	536649	7501262	02/08/15	09/08/15	7	25	175
Total Pit Effort								350
Total Elliott/Cage Effort								330
Total Funnel Effort								280
Total Systematic Sampling Effort								960

3.3.3 Bat Sampling

Bat sampling was conducted using echolocation call recorders (SM2BAT SongMeter units), which detect and record ultrasonic echolocation calls emitted during bat flight (Wildlife Acoustics 2010).

Sampling was undertaken at six locations (Figure 3.4) however the equipment failed at one site; the SM2 units were therefore deployed for a total of 15 nights at five locations (Table 3.4). The SM2 units were placed in locations through which bats were considered likely to travel, including cave entrances, cliff faces, rocky overhangs, or in potential flyways such as through gorges and valleys (Plate 3.1 to Plate 3.6). Three additional bat sampling sites within the study area from previous surveys are shown on Figure 3.4 and discussed in Section 4.7.1.

Table 3.4: Bat sampling locations and effort.

Site	Easting (mE)	Northing (mN)	Habitat	Date Deployed	Date Collected	Nights Sampled
MAMBAT93-01	537635	7502527	Cave entrance at free face.	02/08/15	05/08/15	0*
MAMBAT93-02	539635	7503229	Free face; overlooking large, open drainage area containing riparian vegetation.	05/08/15	08/08/15	3
MAMBAT54-01	536638	7501259	Narrow point in a large gorge.	02/08/15	05/08/15	3
MAMBAT54-02	537390	7504049	Top of a free face, facing front of range.	05/08/15	08/08/15	3
MAMBAT81-01	535721	7501070	Cave entrance within a large gorge.	02/08/15	05/08/15	3
MAMBAT81-02	535680	7501063	Semi-permanent (possibly permanent) waterhole in a gorge; possible cave present nearby.	05/08/15	08/08/15	3
Total						15

*Equipment malfunction – no recordings made.



Plate 3.1: MAMBAT93-01.



Plate 3.2: MAMBAT93-02.



Plate 3.3: MAMBAT54-01.



Plate 3.4: MAMBAT54-02.



Plate 3.5: MAMBAT81-01.



Plate 3.6: MAMBAT81-02.

3.3.4 Motion Sensor Cameras

Motion sensitive cameras were deployed at eight sites throughout the study area, primarily to target Northern Quolls (Figure 3.4). The majority of the cameras were located in rocky overhangs, but also next to ephemeral and semi-permanent/permanent water bodies (Plate 3.7 to Plate 3.14). A bolus of bait (peanut butter, oats and bacon) was smeared on the ground in front of the cameras to attract animals into the field of view of the camera. The motion cameras were deployed for a total of 23 nights (Table 3.5).

Table 3.5: Motion camera locations and effort.

Site	Easting (mE)	Northing (mN)	Habitat	Date Deployed	Date Collected	Nights Sampled
MAMCAM05-01	528850	7497278	Artificial water source (cattle water trough).	03/08/15	05/08/15	3
MAMCAM09-01	536664	7501731	In space beneath pile of boulders in gorge.	02/08/15	05/08/15	3
MAMCAM09-02	536754	7501533	Ephemeral waterhole in large gorge.	02/08/15	05/08/15	3
MAMCAM10-01	537635	7502527	Cave at free face.	02/08/15	05/08/15	3
MAMCAM11-01	537405	7504006	Alcove/cave at breakaway.	05/08/15	08/08/15	3
MAMCAM12-01	539635	7503229	Drainage line leading to free face.	05/08/15	08/08/15	3
MAMCAM13-01	535702	7501065	Semi-permanent waterhole in gorge.	05/08/15	08/08/15	3
MAMCAM14-01	528861	7497275	Artificial water source (pooled water from leaking water tank).	07/08/15	09/08/15	2
Total						23



Plate 3.7: MAMCAM05-01.



Plate 3.8: MAMCAM09-01.



Plate 3.9: MAMCAM09-02.



Plate 3.10: MAMCAM10-01.



Plate 3.11: MAMCAM11-01.



Plate 3.12: MAMCAM12-01.



Plate 3.13: MAMCAM13-01.



Plate 3.14: MAMCAM14-01.

3.3.5 Avifauna Sampling

Avifauna sampling was undertaken using a combination of the following techniques:

- unbounded area searches (40 minutes duration) conducted twice at each systematic trapping transect; and
- opportunistic observations of birds recorded in the survey area.

Eighteen systematic avifauna census surveys were completed at nine locations in 2015 (Table 3.6 and Figure 3.4). Surveys were targeted at discrete landforms, typically corresponding to vegetation type at each trapping site (e.g. minor drainage lines, areas of woodland, etc). Surveys were conducted between approximately 6:45 am and 11:45 am, with a total of 12 hours dedicated to systematic avifauna sampling during the survey.

Table 3.6: Starting time of systematic avifauna sampling censuses conducted within the study area.

Site	03/08/15	04/08/15	05/08/15	06/08/15	07/08/15	08/08/15
MAM01P		06:54			07:56	
MAM02P		11:02			06:52	
MAM03P	06:53			09:12		
MAM04P	09:25			08:29		
MAM05P	08:36			07:02		
MAM06F	07:52			07:49		
MAM07F/MAM07C		08:02				09:30
MAM08E		10:03			10:11	
MAM09E		08:58			09:29	

3.3.6 Other Non-Systematic Sampling

A range of non-systematic fauna observation techniques was undertaken by the fauna survey team to supplement the systematic trapping data and to investigate additional habitats or microhabitats identified during the course of the survey (GPS track-logs are presented in Figure 3.5). These activities included:

- habitat specific searches for Schedule and Priority listed fauna;
- searches of microhabitats (e.g. by raking leaf litter and turning rocks and logs) for reptiles, frogs and small mammals not commonly recorded via trapping;
- recording and identification of secondary signs (where possible), including tracks, scats, skins, mounds and diggings;
- identification of road kills and other animal remains; and
- night spotting and nocturnal searches on foot and in vehicle over a period of three hours on one night (4th August).

Additional opportunistic fauna observations were recorded by the field botanists while undertaking the flora and vegetation survey of the study area (Biota 2016), which supplemented the non-systematic sampling effort by the zoologists. The following features were recorded by the botanists when encountered during their extensive foot traverses through the study area (see GPS track-logs presented in Figure 3.5):

- mounds of the Western Pebble-mound Mouse;
- snail shells;
- sightings of fauna of conservation significance (where confident; e.g. Rainbow Bee-eaters); and
- habitats of significance (e.g. water holes, riparian vegetation, and potential caves), the locations of which were later verified by the zoologists.

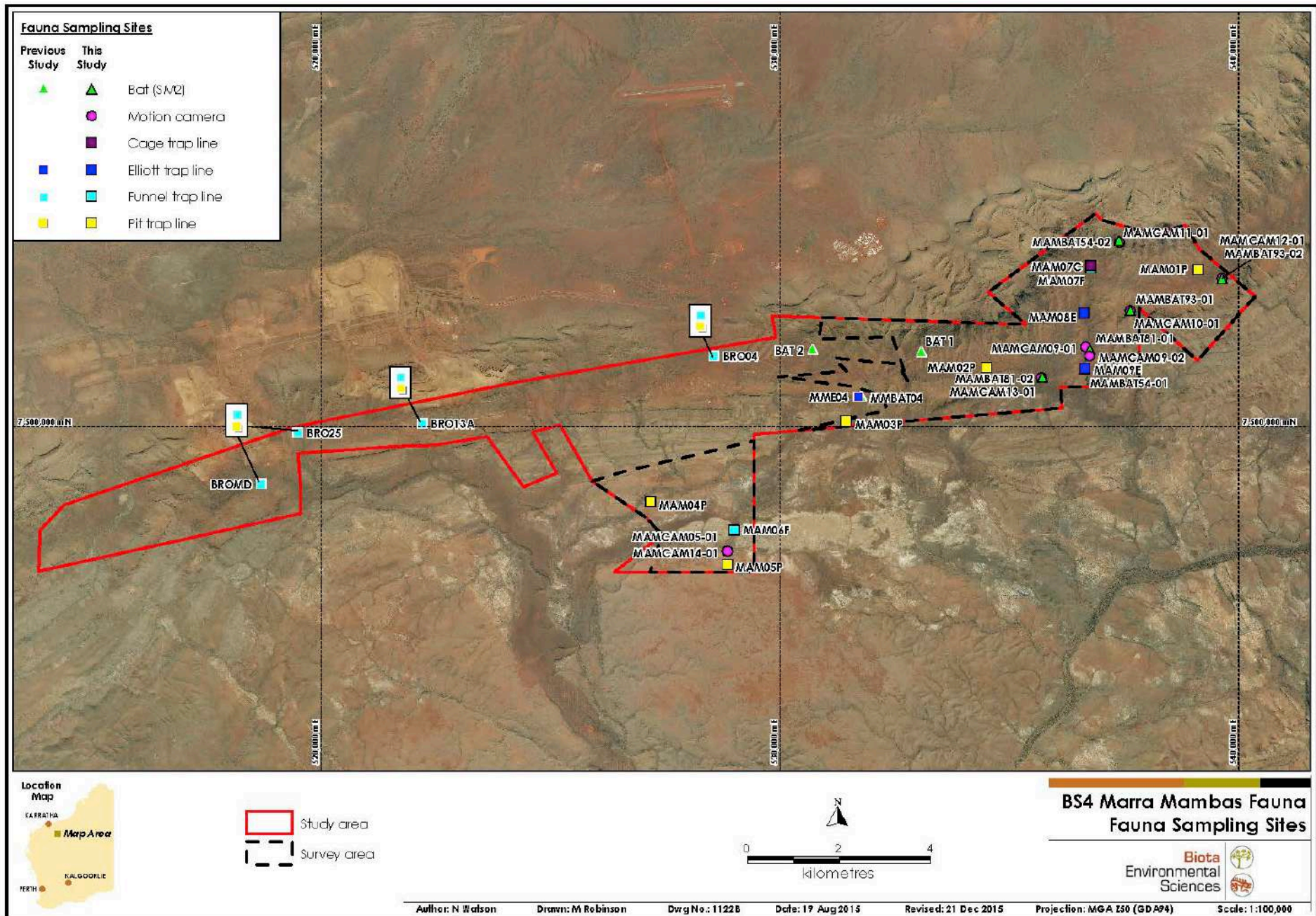


Figure 3.4: Fauna sampling sites assessed within the study area.

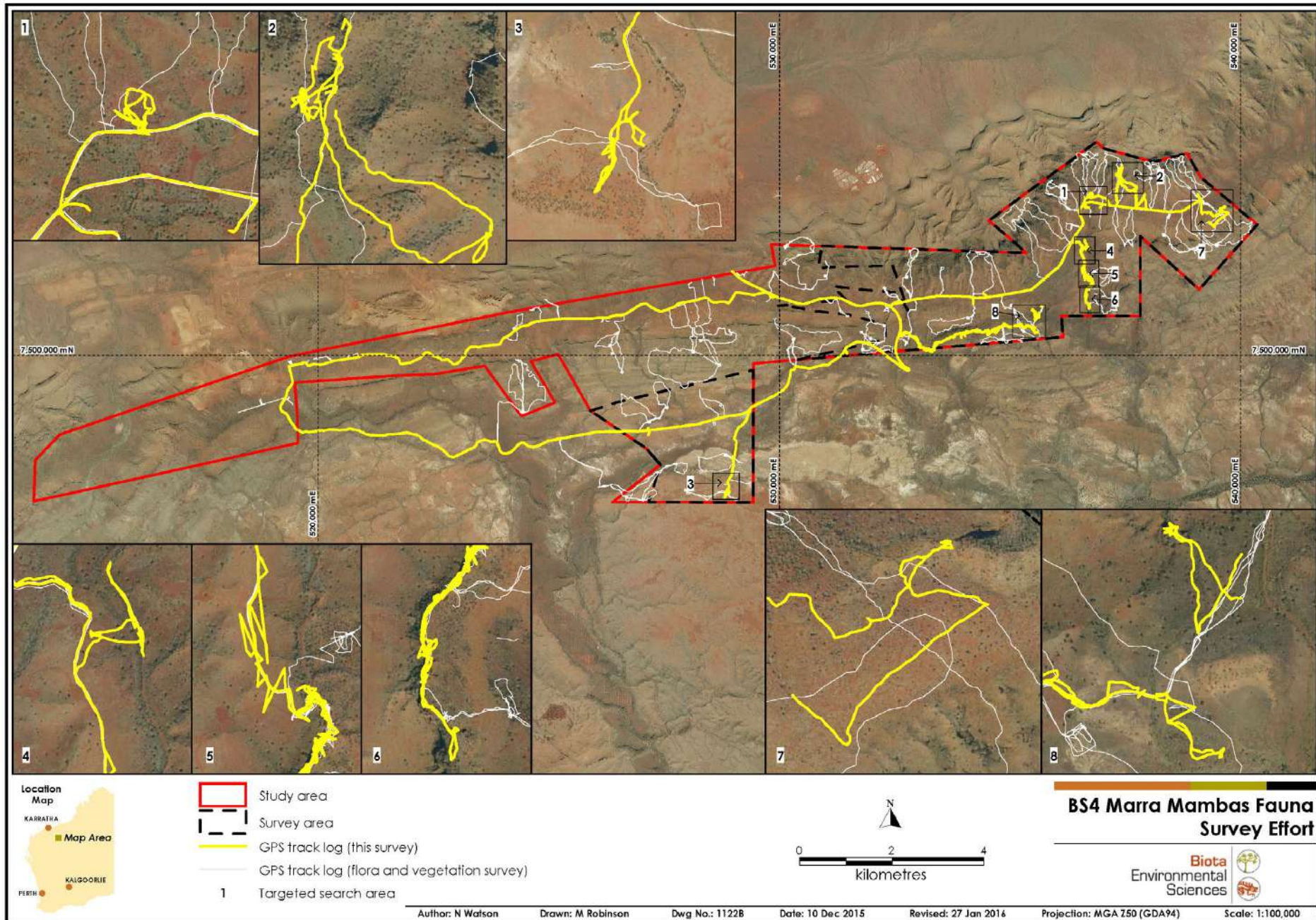


Figure 3.5: GPS track logs of targeted searches completed in 2015.

3.3.7 SRE Invertebrate Fauna

SRE invertebrates are taxonomic groups of invertebrates that exhibit naturally small distributions; this should be less than 10,000 km², as per Harvey (2002). Certain groups of invertebrates are pre-disposed to short-range endemism through poor dispersal capabilities, confinement to disjunct habitats, slow reproduction and low fecundity (Harvey 2002, Ponder and Colgan 2002). Given the importance of short-range endemism to the conservation of biodiversity (EPA 2009), the assessment of such invertebrate taxa is a potentially important component of EIA. Examples of taxonomic groups that show high levels of short-range endemism in this respect include mygalomorph spiders, millipedes, pseudoscorpions, and both freshwater and terrestrial molluscs (EPA 2009).

Based on reviews of SRE data for the region, the SRE sampling sites were primarily selected to target Mygalomorphae (trapdoor spiders) and Pulmonata (land snails), with secondary effort directed towards pseudoscorpions, scorpions and millipedes. Invertebrate fauna collected in the pitfall traps were also assessed for potential SRE taxa.

3.3.7.1 Mygalomorph Spiders

Mygalomorph spider burrows were located visually and were photographed prior to excavation. Holes were dug adjacent to each burrow, thereby allowing the burrow to be followed down with forceps until the spider was located. Collected spiders were preserved in 70% ethanol to preserve morphological characteristics, with two legs removed and placed in 100% ethanol to conserve DNA for molecular studies.

3.3.7.2 Snails

Searches for land snails were conducted by:

- excavating the soil and leaf litter around the base of *Ficus* trees and under spinifex hummocks; and
- searching under rocks and in rock crevices.

Snail shells were collected; where live specimens were recorded, these were stored in calico bags.

3.3.7.3 Other Taxa

Searches for pseudoscorpions were conducted by searching beneath rocks and bark. Sieving of leaf litter was also undertaken to target pseudoscorpions, millipedes and scorpions.

3.3.7.4 Overall SRE Sampling Effort

Targeted SRE fauna searches were carried out at 11 sites (Table 3.7, Figure 3.6, Plate 3.15 to Plate 3.25). Over 18.5 hours of survey effort was spent searching for SRE fauna in 2015 (Table 3.7). Six additional SRE sites that were searched as part of a previous survey (Biota 2013a) are shown on Figure 3.6 and discussed in Section 4.7.1.

Table 3.7: SRE sampling sites.

Site	Easting (mE)	Northing (mN)	Methods	Habitat	Survey Effort (minutes)
MAMSRE01	534506	7501295	Burrow search, searching beneath rocks and bark	Open <i>Acacia</i> spp. woodland on footslope	60
MAMSRE02	528960	7497377	Burrow search, hummock turning	Minor drainage line	120
MAMSRE03	535426	7500542	Burrow search, hummock turning	Alluvial floodplain	120
MAMSRE04	539101	7503406	Burrow search	Scattered <i>Acacia xiphophylla</i> on footslope	120
MAMSRE05	534369	7500514	Snail search, hummock turning	Minor drainage line	100
MAMSRE06	536706	7501632	Burrow search	Gorge	60
MAMSRE07	535603	7500506	Snail search, hummock turning	Minor drainage line	180
MAMSRE08	536966	7503477	Burrow search, searching beneath rocks and bark	Open <i>Acacia</i> spp. woodland on footslope	120
MAMSRE09	536659	7502396	Hummock turning	Drainage line	120
MAMSRE10	539807	7503319	Leaf litter raking and sieving	Gorge	60
MAMSRE11	539734	7503451	Leaf litter raking and sieving	Minor drainage line	60
Total					1,120



Plate 3.15: MAMSRE01.



Plate 3.16: MAMSRE02.



Plate 3.17: MAMSRE03.



Plate 3.18: MAMSRE04.



Plate 3.19: MAMSRE05.



Plate 3.20: MAMSRE06.



Plate 3.21: MAMSRE07.



Plate 3.22: MAMSRE08.



Plate 3.23: MAMSRE09.



Plate 3.24: MAMSRE10.



Plate 3.25: MAMSRE11.

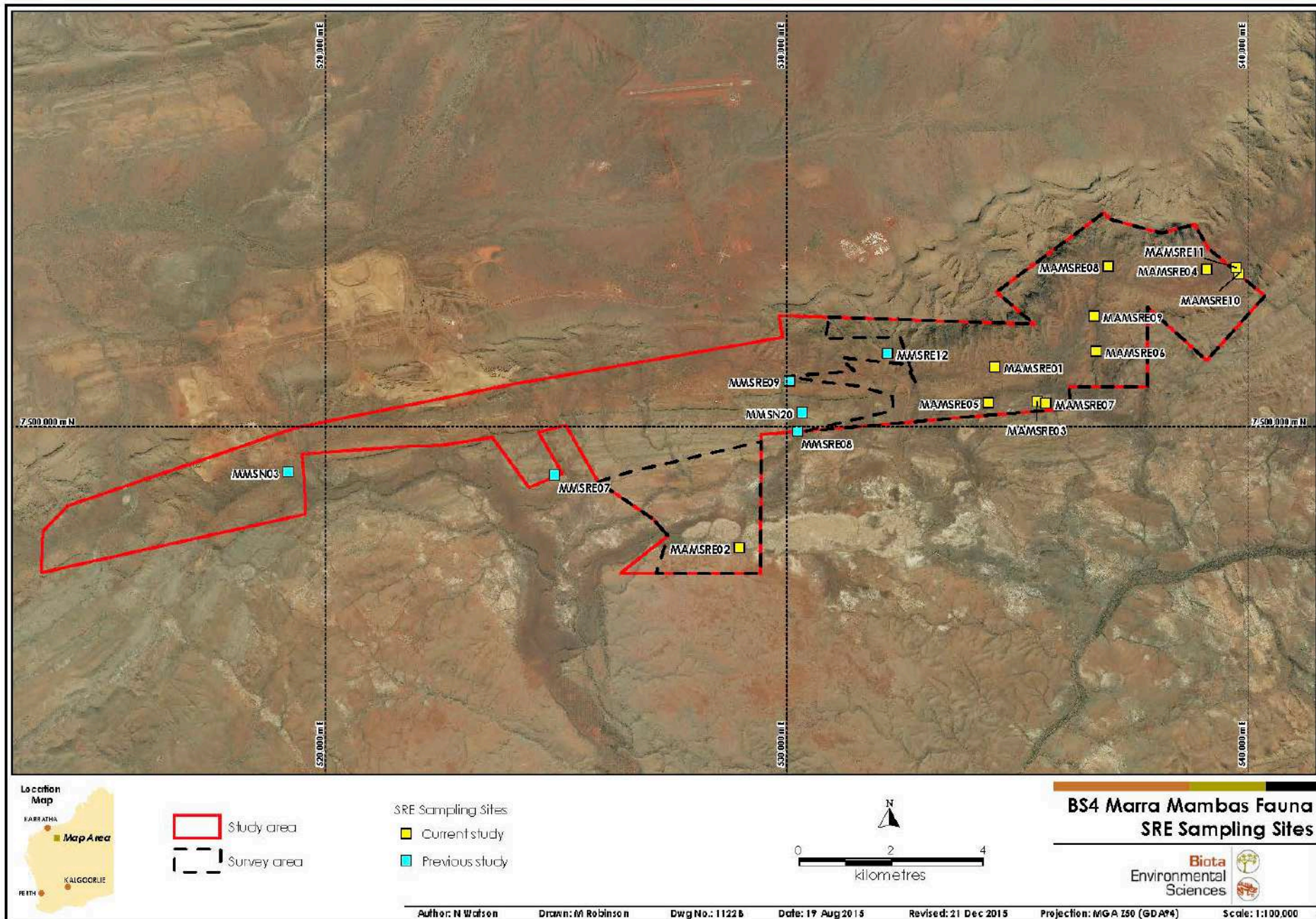


Figure 3.6: SRE sampling sites within the study area.

3.4 Nomenclature

Consistent with EPA and DEC (2010), species nomenclature for herpetofauna and mammals in this report follows the standards of the WAM fauna taxonomic checklist, which is revised and released every six months or as necessary. Avifauna nomenclature is in accordance with Christidis and Boles (2008).

3.5 Analysis

3.5.1 Determining SRE Status

Due to the difficulties inherent in assessing SRE status of invertebrates (see Section 3.6), Biota developed a systematic approach that is applied across all reports in an attempt to provide a clear and consistent method that allows comparative analyses across surveys. Table 3.8 provides the criteria used in this report to determine the SRE status of putative species.

Table 3.8: Criteria used to determine SRE status.

SRE Status	Defining Criteria
Known SRE	<ul style="list-style-type: none"> Species, morphotype or genetic type has a documented range of <10,000 km². Species, morphotype or genetic type is well collected with numerous specimens typed and habitat preference understood.
Potential SRE	<ul style="list-style-type: none"> Species, morphotype or genetic type has a documented range of <10,000 km² but is poorly sampled. Specimen may not be formally described or assigned to a morphotype / genetic type. Short-range endemism may be common in genus or family. May have been collected from restricted, refugial or isolated habitats.
Unlikely to be an SRE	<ul style="list-style-type: none"> Species, morphotype or genetic type has a documented range of <10,000 km² but is poorly sampled. Specimen may not be formally described or assigned to a morphotype / genetic type. Short-range endemism is not common in genus or family. Taxon was not collected from restricted, refugial or isolated habitats. Few other individuals of the taxon collected, but records are separated by long distances (>100 km).
Not an SRE	<ul style="list-style-type: none"> Specimen formally described or assigned to a morphotype / genetic type. Species, morphotype or genetic type has a documented range of >10,000 km².
Undetermined	<ul style="list-style-type: none"> Taxa where there is insufficient taxonomic framework available to provide any informed comment on the species-level distribution of the fauna or, therefore, the risk of small-scale spatial restrictions.

3.5.2 Species Accumulation

Plots of species accumulation curves and trends in the resultant curves over time can be used to assess sampling adequacy. When a survey has sampled an adequate proportion of the faunal community, the curve should plateau and approach asymptote. PRIMER v6.1 was used to calculate smoothed species accumulation curves based on 999 random permutations of the species data. Actual observed accumulation curves were also plotted (see Section 5.4).

Species accumulation curves alone cannot be reliably used to extrapolate predicted species richness for future biological sampling. In order to estimate asymptotic richness (i.e. an extrapolation of species richness), the following asymptotic estimators were used (Clarke and Gorley 2006):

- Bootstrap estimator;
- Chao 1 richness estimator; and
- Jackknife richness estimator.

3.5.3 Vertebrate Assemblage Analysis

A contextual comparison of fauna records from surveys conducted within 50 km of the study area was undertaken in order to place the recorded faunal assemblage into context. Data from 11 surveys were used to place the current survey data in regional context (Table 3.9). The spatial distribution of the survey areas is shown in Figure 3.7.

Table 3.9: Survey data used in the vertebrate fauna assemblage analysis.

Survey	Survey Timing	Code Used in Analysis
Fauna Habitats and Fauna Assemblage of the Brockman Syncline 4 Project, near Tom Price (Biota 2005)	i) 18 th – 30 th October 2004 ii) 12 th – 21 st April 2005	BRO
Tom Price Power Line West Detritals: Two-Phase Fauna Survey (Biota 2009a)	i) 17 th – 25 th September 2007 ii) 3 rd – 10 th September 2008	TPP
West Turner Syncline Section 10 Development Two-Phase Fauna Survey (Biota 2009b)	i) 12 th – 23 rd July 2007 ii) 21 st – 29 th July 2008	WTT
A Two-Phase Fauna Survey of the West Turner Syncline Area (Biota 2009c)	i) 12 th – 23 rd July 2007 ii) 21 st – 29 th July 2008	WTT
Silvergrass West Vertebrate Fauna, SRE and Habitat Assessment (Biota 2009d)	14 th – 16 th May 2009	SIV
Beasley River Limonites Baseline Fauna Survey (Biota 2009e)	21 st – 31 st May 2009	BRL
A Targeted Terrestrial Fauna Survey of the Brockman Syncline 2 Pit 7 Extension Area (Biota 2009f)	7 th – 11 th September 2009	BTF
A Targeted Terrestrial Fauna Survey of Expansion Areas at Nammuldi-Silvergrass (Biota 2009g)	6 th – 12 th October 2008	NET
Nammuldi Infill Areas Fauna Survey (Biota 2010a)	11 th – 13 th November 2009	NET
Brockman 2 Sustaining Tonnes Targeted Fauna Survey (Biota 2010b)	27 th April – 6 th May 2010	BTF
West Turner Syncline Targeted Fauna Survey (Biota 2013b)	4 th – 10 th October 2012	WTT
Current survey	30 th July – 9 th August 2015	MAM

The combined fauna data set was analysed using PRIMER v6.1 (Clarke and Gorley 2006). The following record types have the potential to bias the results and were therefore excluded from the analyses:

- opportunistic records that represented chance events and were not derived from equivalent sampling methods across sites;
- records from Elliott traps and funnel traps for herpetofauna analysis, as these traps typically target specific mammal species;
- large body-size species that would not have been adequately sampled by the trapping sites (such as *Varanus panoptes* and *Pseudechis australis*), even when sightings occurred at systematic trap sites (i.e. not purely opportunistic records); and
- frog species, as these are prone to large abundance peaks following wet weather conditions, which can skew site resemblance analyses.

Bat records were also excluded from all data analysis (including the species accumulation analysis) as these were determined by echolocation recordings, which cannot be used to calculate abundance.

The screened site by species matrix for each of the faunal groups was imported into PRIMER and square-root transformed to reduce the influence of high abundance species on the similarity analyses. A resemblance matrix was then constructed using the Bray-Curtis similarity index, which produces a similarity value for all pairs of sites based on species representation and transformed abundances. This was then used to generate a non-metric Multi-Dimensional Scaling (NMDS) plot to assist with visualising the groupings amongst the sites based on faunal composition. A 20% similarity level was used to inform assemblage groupings in correspondence with Similarity Profiles (SIMPROF) test results.

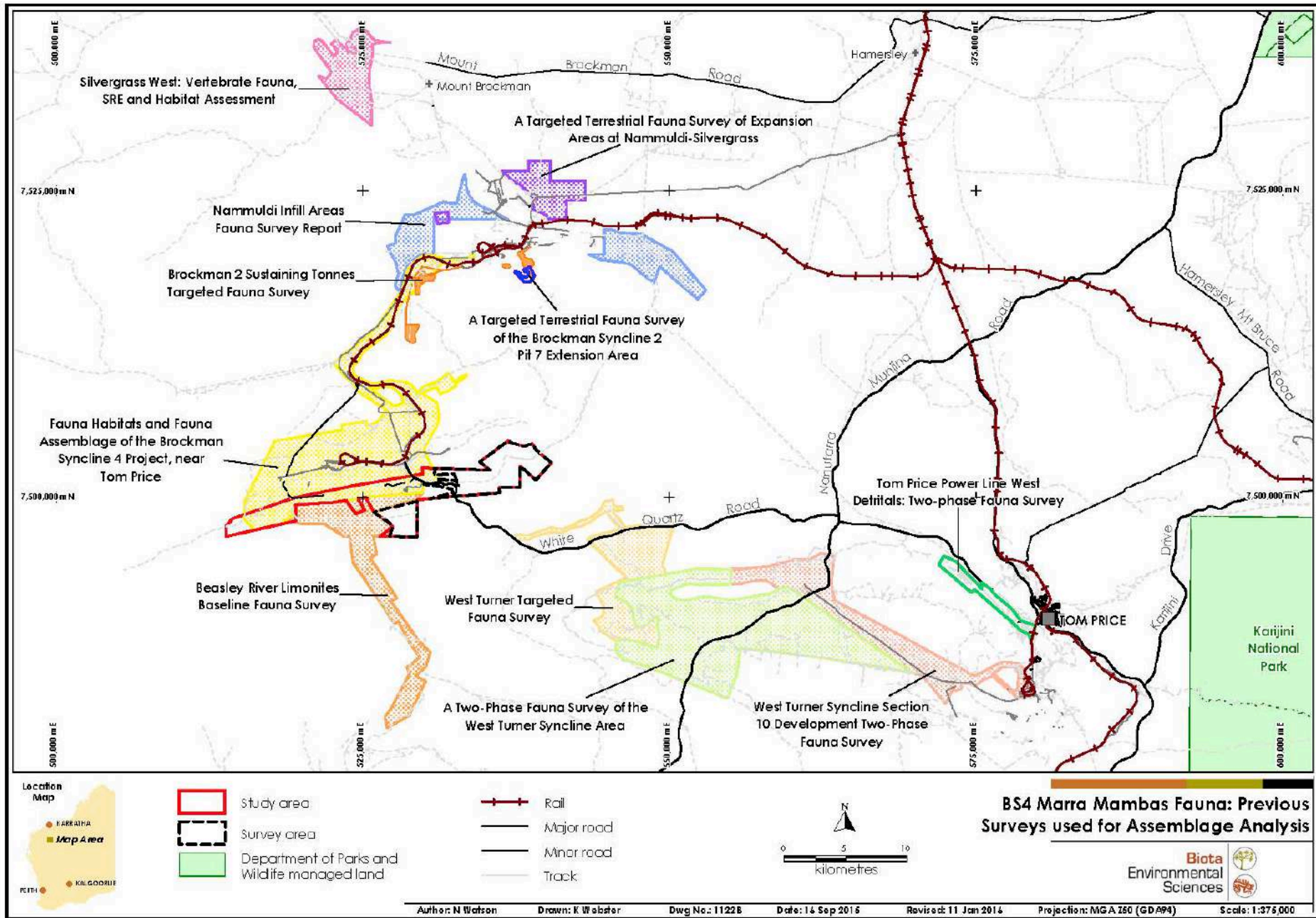


Figure 3.7: Location of previous surveys included in the vertebrate fauna assemblage analysis.

3.6 Study Limitations

The 2015 survey and this report are subject to the following limitations:

- The records from the current survey are from a single sampling phase only. Although a broader dataset has been generated for the study area as a whole by combining previous survey records with the current data, it is likely that an additional seasonal survey would augment the number of species recorded from the survey area.
- The survey timing was not ideal for reptiles, including the Pilbara Olive Python, which are much less conspicuous in winter.
- The extent of suitable habitats in the vicinity of each sampling site was assessed using vehicle and foot traverses as far as practicable, given the limitations imposed by the terrain, available time and safety considerations. While it was not possible to assess these areas exhaustively, trapping was subsequently carried out in habitats considered to be representative of those relevant to the key target species.
- Many potential SRE taxa are difficult to sample adequately (e.g. mygalomorph spiders are difficult to locate, and morphological identification requires adult male specimens, which are often in low abundance and only emerge from their burrow during selective, specific conditions).
- Molecular work has not been completed on the potential SRE invertebrate specimens collected from the study area, and they therefore could not be placed into context at species level to more fully determine if they are of significance.

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4.0 Desktop Assessment

4.1 IBRA Bioregions and Subregions

The Interim Biogeographic Regionalisation for Australia (IBRA) recognises 89 bioregions (DSEWPaC 2012a). The BS4 Marra Mambas study area is located within the Pilbara bioregion.

The Pilbara bioregion is divided into four subregions: Roebourne Plains, Chichester, Fortescue Plains, and Hamersley (ordered from the northern coast to the southern edge). The BS4 Marra Mambas study area is located within the Hamersley subregion, which covers 6,215,092 ha and is described by Kendrick (2003) as:

"The southern section of the Pilbara Craton. Mountainous area of Proterozoic sedimentary ranges and plateaus, dissected by gorges (basalt, shale and dolerite). Mulga (*Acacia aneura*) low woodland over bunch grasses on fine textured soils in valley floors, and Snappy Gum (*Eucalyptus leucophloia*) over *Triodia brizoides* on the skeletal soils of the ranges. The climate is Semi-desert tropical, average 300 mm rainfall, usually in summer cyclonic or thunderstorm events. Winter rain is not uncommon. Drainage into either the Fortescue (to the north), the Ashburton to the south, or the Robe to the west."

4.2 Land Systems

Land systems (rangelands) mapping covering the study area has been prepared by the Western Australian Department of Agriculture (Payne et al. 1988). Land systems comprise repeating patterns of topography, soils, and vegetation. Six land systems are present within the BS4 Marra Mambas study area, all of which are well represented in the locality (Table 4.1, Figure 4.1). The majority of the study area is represented by the Newman and Rocklea land systems (Table 4.1).

Table 4.1: Land systems of the BS4 Marra Mambas study area.

Land System	Land Type	Description	Area (ha)	% of Study Area
Newman	Hills and ranges with spinifex grasslands.	Rugged jaspilite plateaus, ridges and mountains supporting hard spinifex grasslands.	2,748	47.3
Platform	Stony plains with spinifex grasslands.	Dissected slopes and raised plains supporting hard spinifex grasslands.	776	13.4
Robe	Mesas, breakaways and stony plains with spinifex grasslands.	Low plateaus, mesas and buttes of limonites supporting soft spinifex (and occasionally hard spinifex) grasslands.	400	6.9
Rocklea	Hills and ranges with spinifex grasslands.	Basalt hills, plateaus, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	1,568	27.0
Table	Plateaus, mesas and breakaways with acacia shrublands.	Low calcrete plateaus, mesas and lower plains supporting mulga and senna shrublands and minor spinifex grasslands.	102	1.8
Wona	Undulating stony plains with cracking clay soils and tussock grasslands.	Basalt upland gilgai plains supporting tussock grasslands and minor hard spinifex grasslands.	212	3.6
Total			5,806	100.0

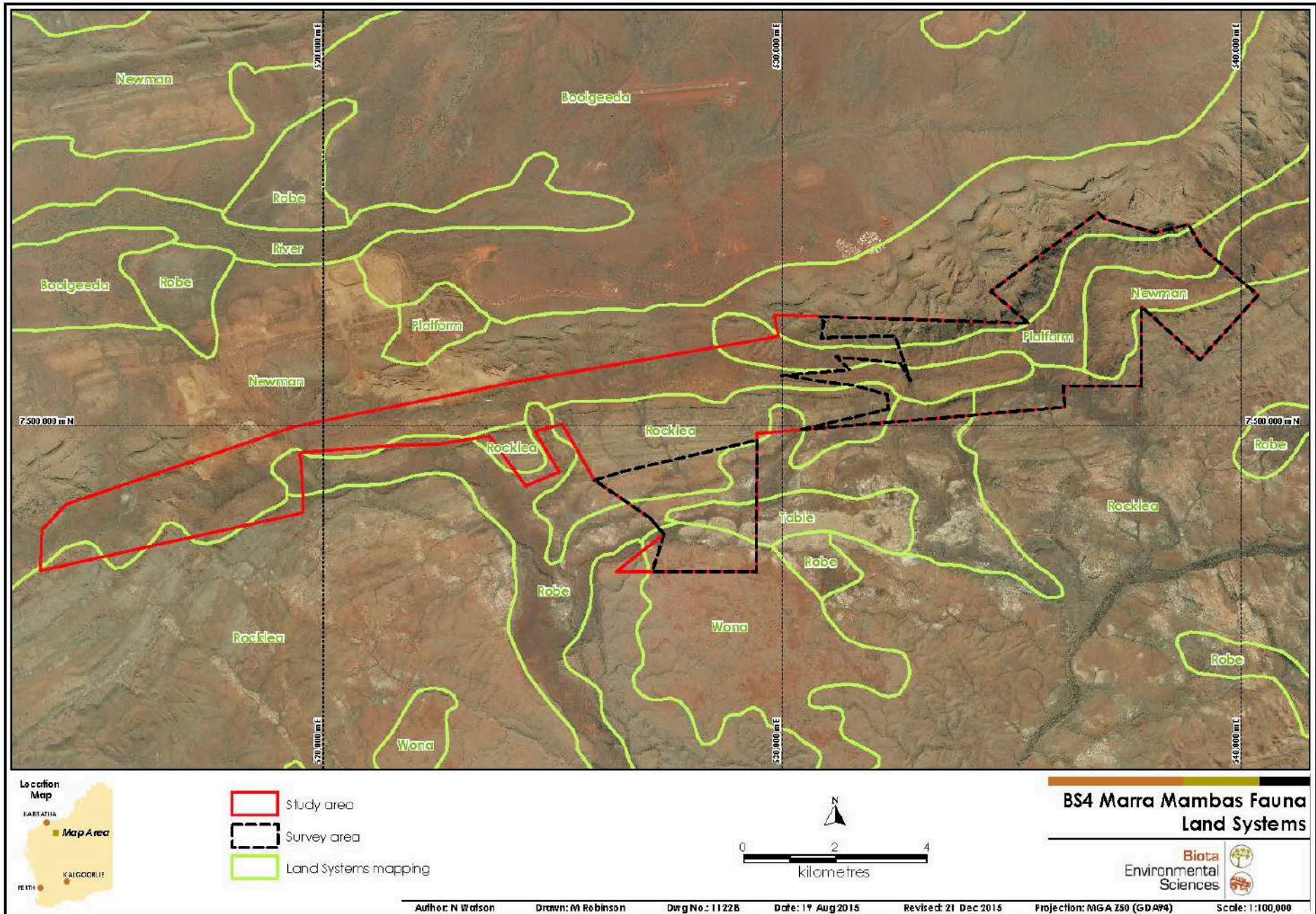


Figure 4.1: Land systems of the study area.

4.3 Geology

The study area encompasses 14 major geological units (Geological Survey of Western Australia 1984) (Table 4.2; Figure 4.2). The majority of the study area is represented by colluvium (32%), followed by Marra Mamba Iron Formation (19%) (Table 4.2).

Table 4.2: Geological units of the BS4 Marra Mambas study area.

Geological Eon	Geological Era	Geological Period	Unit Code	Geological Description	Area (ha)	% of Study Area
Phanerozoic	Cainozoic	Quaternary	Qa	Alluvium: unconsolidated silt, sand, and gravel; in drainage channels and adjacent floodplains	66.5	1.2
			Qc	Colluvium: unconsolidated quartz and rock fragments in soil	23.8	0.4
		-	Czc	Colluvium: partly consolidated quartz and rock fragments in silt and sand matrix; old valley-fill deposits, locally derived	1,842.2	31.7
			Czk	Calcrete: sheet carbonate, found along major drainage lines	69.4	1.2
			Czp	Robe Pisolite: pisolitic limonite deposits developed along river channels	134.4	2.3
			Czr	Hematite-goethite deposits on banded iron-formation and adjacent scree deposits	574.2	9.9
Proterozoic			PLHb	Brockman Iron Formation: banded iron-formation, chert, and pelite	376.2	6.5
Archaean	-		AFd	Medium- to coarse-grained metadolerite sills intruded into Fortescue Group	202.9	3.5
		AFj	Jeerinah Formation: pelite, metabasaltic pillow lava and breccia, and metamorphosed felsic volcanic rock; intruded by metadolerite sills.	646.5	11.1	
		AFjl	Pillowed and massive metabasaltic flows and metabasaltic breccia	120.0	2.1	
		AFu	Bunjinah Formation: pillowed and massive metabasaltic flows, metabasaltic breccia, metamorphosed volcanic sandstone, and minor chert; amygda	436.8	7.5	
		AHd	Wittenoom Formation: metamorphosed thin- to medium-bedded dolomite, dolomitic pelite, chert, and volcanic sandstone	6.7	0.1	
		AHm	Marra Mamba Iron Formation: chert, banded iron-formation, and pelite	1,091.0	18.8	
		AHs	Mount McRae Shale and Mount Sylvia Formation: pelite, chert, and banded iron formation	215.4	3.7	
Total					5,806.0	100.0

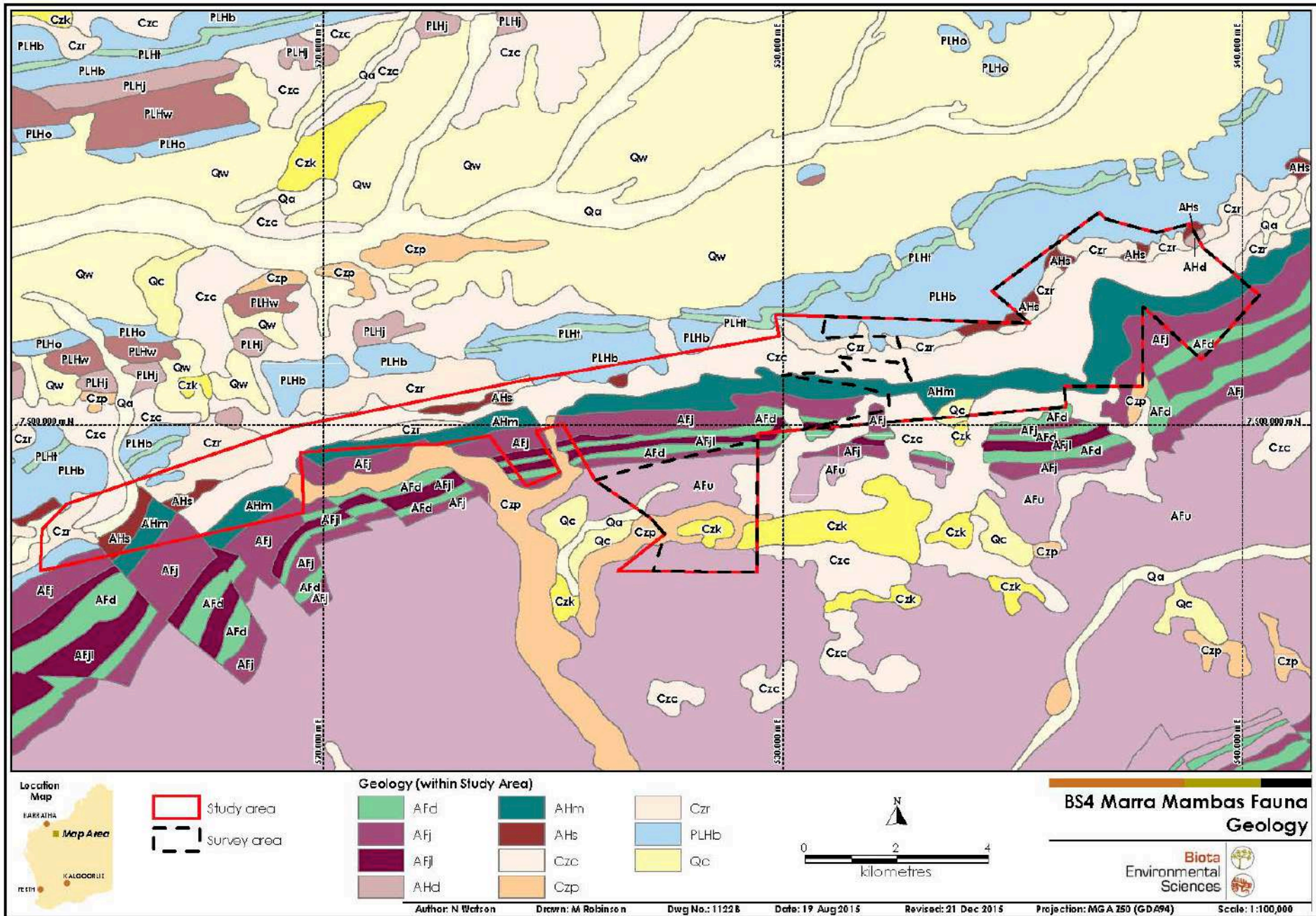


Figure 4.2: Geological units of the study area.

4.4 Conservation Reserves in the Locality

The closest conservation reserve to the study area is the class A Karijini National Park, 52 km to the east (Figure 2.1). Other reserves in the locality include:

- the class A Millstream-Chichester National Park, 106 km north of the study area;
- the class A Mungaroona Range Nature Reserve, 120 km northeast of the study area;
- the class A Barlee Range Nature Reserve, 131 km southwest of the study area; and
- the class C Cane River Conservation Park, 149 km west-northwest of the study area.

4.5 Vegetation

Beard (1975) mapped the vegetation of the Pilbara and northern Gascoyne bioregions at a scale of 1:1,000,000. The study area lies within the Fortescue Botanical District of the broader Eremaean Botanical Province as defined by Beard (1975). The vegetation of this province is typically open and frequently dominated by spinifex, wattles and occasional eucalypts. Fine-scale vegetation mapping of the study area is presented in Biota (2016).

4.6 Threatened and Priority Ecological Communities in the Locality

No Threatened Ecological Communities (TECs) have been recorded in the study area. The “*Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)” is the only TEC in the locality, occurring approximately 30 km north of the study area at its closest point. This TEC is considered to be at risk from grazing and trampling by stock, weed invasion, changed fire regimes and alteration of hydrology (Department of Parks and Wildlife 2014). There is no suitable habitat for this TEC in the study area (Biota 2016).

No Priority Ecological Communities (PECs) have been recorded within the study area. The “Brockman Iron cracking clay communities of the Hamersley Range” (Priority 1) lies within approximately 30 km of the study area and is described as “rare tussock grassland dominated by *Astrelba lappacea* on the Brockman land system. It comprises tussock grassland on cracking clays derived in valley floors, depositional floors” (Department of Parks and Wildlife 2015). This PEC is considered to be at risk from grazing, mining and infrastructure developments (Department of Parks and Wildlife 2015). While there is some cracking clay habitat in the study area within the Wona land system, this does not support the above PEC (Biota 2016).

4.7 Fauna Assessment

4.7.1 Previous Surveys in the Study Area

Several fauna surveys have been conducted within the locality of the study area (see Figure 3.7), and six surveys directly overlapped sections of the study area (Table 4.3 and Figure 4.3). Three of these surveys sampled sites that lie within the study area, as listed in Table 4.3 and shown in Figure 3.4.

Table 4.3: Previous fauna surveys that overlap the study area.

Survey	Survey Type	Survey Area (ha)	Survey Timing	Sites within Study Area	Limitations
Fauna Habitats and Fauna Assemblage of the Brockman Syncline 4 Project, near Tom Price (Biota 2005)	Level 2 survey, two phases	11,796	i) 18 – 30 October 2004 ii) 12 – 21 April 2005	4 pitfall and funnel trapping sites (BRO04, BRO13A, BRO25, BRO-MD)	Sampling targeted development areas
Beasley River Limonites Baseline Fauna Survey (Biota 2009e)	Level 2 survey, one phase	4,148	21 – 31 May 2009	No overlapping sites	Single phase of sampling
Brockman Syncline 4 Marra Mamba Targeted Fauna Survey (Biota 2013a)	Targeted vertebrate and SRE fauna survey	1,921	28 August – 4 September 2012	1 Elliott trapping site (MME04) 1 bat sampling site (MMBAT04) 6 SRE search sites (MMSN03, MMSN20, MMSRE07, MMSRE08, MMSRE09, MMSRE12)	Single phase of targeted sampling
Marra Mamba West Native Vegetation Clearing Permit (NVCP) Report (Biota 2013c)	Level 1 survey, opportunistic records only	325	14 – 18 September 2013	No overlapping sites	Sampling targeted conservation significant fauna
Brockman 4 Eastern Edge NVCP Report (Biota 2014)	Level 1 survey, opportunistic records only	337	24 – 28 July 2014	2 bat sampling sites (BAT1, BAT2)	Sampling targeted conservation significant fauna
Brockman Syncline Marra Mamba Biological Assessment (Astron 2014)	Level 1 survey, opportunistic records only	153	18 – 23 September 2014	No overlapping sites	Sampling targeted conservation significant fauna

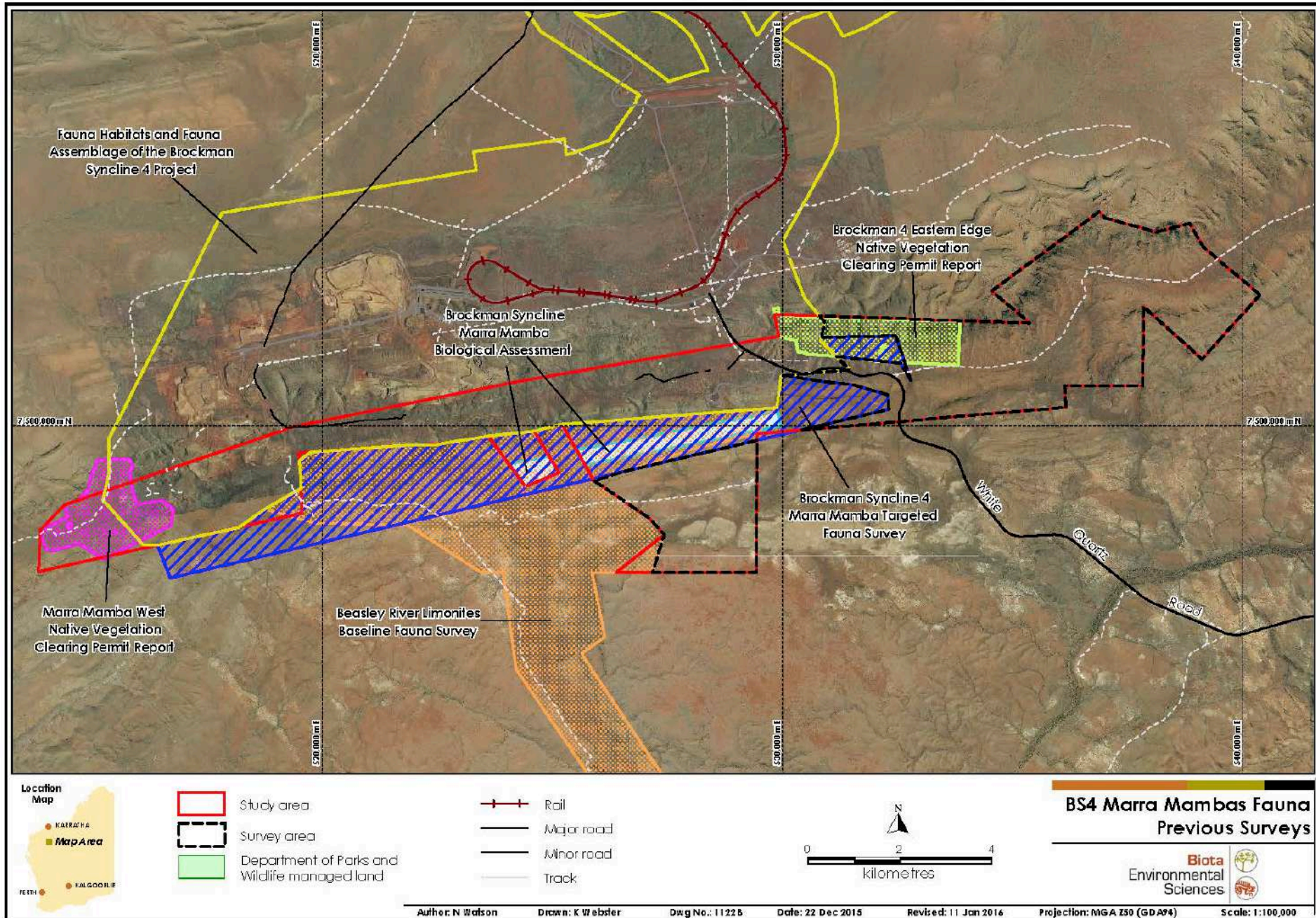


Figure 4.3: Previous surveys that overlapped the study area.

4.7.2 Potential Fauna Species of the Study Area

4.7.2.1 Vertebrate Fauna

In order to compile a potential species list for the study area as a whole, fauna records were collated from the database searches (covering a 40 km buffer around the study area). The compiled data comprised a total of 141 bird species, 92 reptile species, 28 ground-dwelling mammal species, 15 bat species and four amphibian species (see Appendix 4).

Of these, 19 species are of State and/or Commonwealth conservation significance (Table 4.4). Four of these species had been recorded in the study area during previous surveys, and a further five species were considered likely to occur or to have the potential to occur (see Section 3.1.3 for an explanation of the rankings).

Table 4.4: Conservation significant fauna species identified from database searches and overlapping surveys, and their likelihood of occurrence in the study area based on the desktop review.

Family	Species	Common Name	Conservation Status		Source of Record	Likelihood of Occurrence in the Study Area
			Federal	State*		
Avifauna						
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift	Migratory	S5	Biota (2014)	Recorded
Ardeidae	<i>Ardea ibis</i>	Cattle Egret	Migratory	S5	Database search	Unlikely to occur
	<i>Ardea modesta</i>	Eastern Great Egret	Migratory	S5	Database search	Unlikely to occur
Charadriidae	<i>Charadrius veredus</i>	Oriental Plover	Migratory	S5	Database search	Unlikely to occur
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	Migratory	S5	Biota (2005, 2009e)	Recorded
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	Migratory	S5	Database search	Unlikely to occur
	<i>Gallinago megala</i>	Swinhoe's Snipe	Migratory	S5	Database search	Unlikely to occur
Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	-	S2	Database search	Unlikely to occur
Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon	-	S7	Database search	May potentially occur
Herpetofauna						
Boidae	<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	Vulnerable	S3	Biota (2009e)	Likely to occur
Sphenomorphidae	<i>Notoscincus butleri</i>	Lined Soil-Crevise Skink	-	P4	Biota (2005)	Likely to occur
Mammals						
Dasyuridae	<i>Dasyurus hallucatus</i>	Northern Quoll	Endangered	S2	Database search	Unlikely to occur
	<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart	-	P4	Database search	May potentially occur
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby	Vulnerable	S3	Database search	Unlikely to occur
Notoryctidae	<i>Notoryctes caurinus</i>	Northern Marsupial Mole	-	P4	Database search	Would not occur
Rhinonictidae	<i>Rhinonictis aurantia</i>	Pilbara Leaf-nosed Bat	Vulnerable	S3	Biota (2009e, 2014)	Recorded
Megadermatidae	<i>Macroderma gigas</i>	Ghost Bat	Vulnerable	S3	Database search	Likely to occur
Muridae	<i>Leggadina lakedownensis</i>	Short-tailed Mouse	-	P4	Biota (2009e)	Likely to occur
	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	-	P4	Biota (2014), Astron (2014)	Recorded

* S = Schedule, P = Priority. The State listings follow those of the *Wildlife Conservation (Specially Protected Fauna) Notice 2015*.

4.7.2.2 SRE Invertebrate Fauna

A search of the WAM Arachnid and Myriapod database and the Land Snail database returned a total of 56 taxa that belong to families known to contain SRE fauna. This total comprised 16 land snail species, 22 mygalomorph spider species, five millipede species, six pseudoscorpion species, one centipede species and six scorpion species, none of which are of conservation significance (Table 4.5).

Table 4.5: Potential SRE invertebrate fauna returned from WAM database searches.

Group	Family	Genus	Species
Land Snails	Bothriembryontidae	<i>Bothriembryon</i>	'Pilbara' sp. nov.
	Camaenidae	Gen. nov.	cf. 'small Mt Robinson' sp. nov.
			sp. nov. 'Z'
		<i>Quistrachia</i>	'cancellate' sp. nov.
		<i>Rhagada</i>	sp.
			'Beasley' sp. nov.
			'Mt. Brockman' sp. nov.
	'Pannawonica' sp. nov.		
	Planorbidae	<i>Bayardella</i>	'small banded' sp. nov.
			'Tom Price' sp. nov.
			<i>radleyi</i>
	Succineidae	<i>Succinea</i>	cf. <i>radleyi</i>
			sp.
sp.			
Mygalomorph Spiders	Actinopodidae	<i>Missulena</i>	<i>melissae</i>
			'MYG040'
			'MYG290-DNA'
	Barychelidae	<i>Aurecocrypta</i>	'MYG057'
			'MYG319-DNA'
		<i>Synothele</i>	'Barlee Rge sp. 1'
			'MYG112'
	Ctenizidae	<i>Conothele</i>	'MYG310-DNA'
			'MYG294-DNA'
	Idiopidae	<i>Aganippe</i>	'MYG298-DNA'
			'MYG301-DNA'
	Nemesiidae	<i>Aname</i>	'MYG302-DNA'
			<i>Euoplos</i>
			'MYG307-DNA'
			'MYG271-DNA'
			'MYG330-DNA'
			'MYG367-DNA'
		'MYG369-DNA'	
	<i>Yilgarnia</i>	'sp. (MYG001 group; female)'	
		'sp. (MYG093 female?)'	
Millipedes	Paradoxosomatidae	<i>Antichiropus</i>	<i>marae</i>
			'MYG374-DNA'
			'MYG375-DNA'
			'DIP010'
			'DIP019 (female)'
	Atemnidae	<i>Oratemnus</i>	'DIP023'
			'DIP024'
			'DIP041'
			'PSE031'
			Pseudoscorpions	Chernetidae	Troglochernes	sp.
Garypidae			
<i>Synsphyronus</i>	'PSE069'		
	'PSE084'		
Chthoniidae	<i>Lagynochthonius</i>	'sp. nov. 8/1 Mt Brockman'	
		'sp. indet.'	
Centipedes	Scolopendridae	<i>Ethmostigmus</i>	cf. <i>nudior</i>

Group	Family	Genus	Species
Scorpions	Buthidae	<i>Isometroides</i>	'sp.?'
		<i>Lychas</i>	'cottae?'
			'splendens ms'
	Urodacidae	<i>Urodacus</i>	'warrambooo 1'
			'megamastigus?'
			'warrambooo'

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5.0 Fauna of the Study Area

5.1 Fauna Habitats

Habitat assessments were based on Biota's fauna landscape approach (Biota 2013d), which identifies landforms within a broader landscape. The distributions of fauna are typically not limited to specific landform elements; rather fauna may utilise many components of a landscape.

The study area contains four defined landscapes (Table 5.1). Functional landforms were identified within these landscapes (as per Table 5.2) based on the ecological niches that may be inhabited by specific species or fauna assemblages (Table 5.1 and Figure 5.1). These were determined primarily on the basis of landform geomorphology, with geology and vegetation also being considered. Examples of representative landforms within the study area and associated survey sites are provided in Table 5.3. This approach also formed the basis of the habitat mapping for MNES fauna species (see Figure 7.1).

Table 5.1: Landscapes and landforms present in the study area.




Landscapes	Functional Landform
LANDSCAPE 1: Mountainous rugged terrain comprising ridges, plateaus and steep hills with free faces	<ul style="list-style-type: none"> • Plateau • Midslope/Upper Slope • Footslope • Gorge/Gully and Free Face • Minor Creekline
LANDSCAPE 2: Dissected gentle slopes and raised plains	<ul style="list-style-type: none"> • Gorge/Gully and Free Face • Midslope/Upper Slope • Footslope • Gently Sloping Rise • Pediment Slope • Alluvial Plain • Major Creekline • Minor Creekline
LANDSCAPE 3: Undulating plains with outcropping	<ul style="list-style-type: none"> • Footslope • Gently Sloping Rise • Debris Slope or Rocky Outcrop • Pediment Slope • Alluvial Plain • Major Creekline • Minor Creekline
LANDSCAPE 4: Cracking clay plains	<ul style="list-style-type: none"> • Wona Colluvial Plain • Minor Creekline





Table 5.2: Landform descriptions.




Functional Landform	Description
Plateau	Relatively flat terrain that is raised significantly above the surrounding area, often with one or more sides with steep slopes. The tallest hills in the study area were 820 m above sea level.
Gorge	An open incision in the landscape, with precipitous walls and a moderately inclined to very steeply inclined floor.
Gully	An open drainage line, which may be deep or shallow. The sides of the gully may have vertical walls, or may be partly eroded according to the type of material forming the walls. The term generally implies a linear surface form.
Free Face	A vertical or near vertical landform element situated part way up a slope but not comprising the entire slope.
Upper Slope	A slope located towards the top of a hill.
Midslope	A gently inclined to steep slope located between the upper slope and foot slope landform elements.

Functional Landform	Description
Footslope	A slope located towards the base of a hill.
Gently Sloping Rise	A gently inclined slope located towards the base of the footslope.
Debris Slope	A moderately inclined to steep slope, consisting of rock accumulated by gravity.
Rocky Outcrop	A visible exposure of rock.
Pediment Slope	A large, gently inclined (<7°) waning lower slope underlain by bedrock at varying depths, with flow lines trending normal to the long axis of the adjacent scarp. Pediments can be narrow or very wide. There is frequently a sharp break of slope between the pediment and the steeper hillside above it. Water passes across the pediment by laminar sheet flow, but if this is disturbed, the flow becomes turbulent and gullies develop.
Colluvial Plain	A large very gently inclined (<2%) or level element, formed by loose unconsolidated material being deposited by either rain wash, sheet wash, slow continuous downslope creep, or a variable combination of these processes.
Alluvial Plain	Flat land area adjacent to a drainage line, composed of unconsolidated sedimentary deposits (alluvium) and subject to periodic inundation by the drainage line.
Major Creekline	A linear, generally sinuous open depression forming the floor of a major drainage line channel (11 – >30 m) that is eroded or aggraded (built up) by stream flow.
Minor Creekline	A linear, generally sinuous open depression forming the floor of a minor drainage line channel (1 – 10 m) that is eroded or aggraded (built up) by stream flow.

Table 5.3: Systematic site descriptions and photographs.

Site	Description	Plate
LANDSCAPE 1: Mountainous rugged terrain comprising ridges, plateaus and steep hills with free faces		
MAM09E	<p><u>Landform:</u> Gorge.</p> <p><u>Vegetation:</u> <i>Eucalyptus leucophloia</i> scattered low trees over <i>Acacia citrinoviridis</i>, <i>Petalostylis labicheoides</i>, <i>Gossypium robinsonii</i>, <i>A. monticola</i> tall open shrubland over <i>Triodia epactia</i> very open hummock grassland.</p> <p><u>Land System:</u> Newman and Rocklea.</p>	
LANDSCAPE 2: Dissected gentle slopes and raised plains		
MAM01P	<p><u>Landform:</u> Pediment slope.</p> <p><u>Vegetation:</u> <i>Corymbia hamersleyana</i>, <i>Acacia xiphophylla</i> scattered low trees over <i>A. pruinocarpa</i>, <i>A. bivenosa</i> shrubland over <i>Triodia wiseana</i> very open hummock grassland.</p> <p><u>Land System:</u> Platform.</p>	
MAM02P	<p><u>Landform:</u> Footslope.</p> <p><u>Vegetation:</u> <i>Acacia aptaneura</i>, <i>A. ayersiana</i> low open woodland over <i>Triodia wiseana</i> very open hummock grassland.</p> <p><u>Land System:</u> Newman.</p>	

Site	Description	Plate
MAM07F	<p><u>Landform:</u> Footslope.</p> <p><u>Vegetation:</u> <i>Acacia aptaneura</i>, <i>Grevillea berryana</i>, <i>A. rhodophloia</i> low open woodland over <i>Triodia epactia</i> very open hummock grassland.</p> <p><u>Land System:</u> Platform.</p>	
MAM07C	<p><u>Landform:</u> Footslope.</p> <p><u>Vegetation:</u> <i>Acacia aptaneura</i>, <i>Grevillea berryana</i>, <i>A. rhodophloia</i> low open woodland over <i>Triodia epactia</i> very open hummock grassland.</p> <p><u>Land System:</u> Platform.</p>	
MAM08E	<p><u>Landform:</u> Minor creekline.</p> <p><u>Vegetation:</u> <i>Acacia citrinoviridis</i>, <i>A. monticola</i>, <i>Petalostylis labicheoides</i> tall shrubland over <i>Triodia epactia</i> very open hummock grassland.</p> <p><u>Land System:</u> Newman.</p>	
LANDSCAPE 3: Undulating plains with outcropping		
MAM03P	<p><u>Landform:</u> Alluvial plain.</p> <p><u>Vegetation:</u> <i>Acacia citrinoviridis</i>, <i>A. ancistrocarpa</i> tall open shrubland over <i>A. bivenosa</i> open shrubland over <i>Triodia epactia</i> open hummock grassland.</p> <p><u>Land System:</u> Rocklea.</p>	

Site	Description	Plate
MAM04P	<p><u>Landform:</u> Pediment slope.</p> <p><u>Vegetation:</u> <i>Acacia bivenosa</i> scattered tall shrubs over <i>Senna glutinosa</i> subsp. x <i>luerssenii</i> low open shrubland over <i>Triodia brizoides</i> open hummock grassland.</p> <p><u>Land System:</u> Robe.</p>	
MAM06F	<p><u>Landform:</u> Minor creekline.</p> <p><u>Vegetation:</u> <i>Eucalyptus leucophloia</i>, <i>Corymbia hamersleyana</i> scattered low trees over <i>Petalostylis labicheoides</i>, <i>Acacia bivenosa</i>, <i>A. ancistrocarpa</i> tall open scrub over <i>Triodia epactia</i> hummock grassland.</p> <p><u>Land System:</u> Table.</p>	
LANDSCAPE 4: Cracking clay plains		
MAM05P	<p><u>Landform:</u> Wona colluvial plain.</p> <p><u>Vegetation:</u> <i>Acacia xiphophylla</i> low open woodland over <i>Senna artemisioides</i> subsp. oligophylla x subsp. <i>helmsii</i>, <i>Sida fibulifera</i> low open shrubland over <i>Triodia longiceps</i> hummock grassland.</p> <p><u>Land System:</u> Wona.</p>	

5.2 Conservation Significant Habitat

Within the study area, three functional landforms were identified as being most likely to support fauna species of conservation significance. These are described in the following sections.

5.2.1 Gorges, Gullies and Free Faces

In the eastern section of the study area, the hills and ranges of the Brockman Syncline Range in the north and the Marra Mamba hills in the south (along with their associated drainage features) have the greatest potential to provide mesic habitats of importance for fauna. Such features include narrow gorges, gullies, free faces, caves and waterholes (see Plate 5.1 and Plate 5.2). The Brockman Syncline Range in the northern section of the study area represents the steepest landform within approximately 10 km of the study area and supported numerous waterholes and

narrow gorges and gullies. Gorges, caves and waterholes were also noted in the drainage features associated with the Marra Mamba hills in the south (Figure 7.1).

5.2.2 Major Creekline Supporting Riparian Vegetation

The southeastern corner of the study area intersects a large drainage feature (a major creekline), which supported true riparian vegetation dominated by River Gum, *Eucalyptus camaldulensis* (Plate 5.3). This riparian vegetation is likely to represent an important habitat for foraging for many species, and was not recorded elsewhere in the study area.

5.2.3 Wona Colluvial Plain

In the central southern section of the study area, an area of undulating plains with cracking clay soils associated with the Wona land system was noted as a unique habitat type not present elsewhere in the study area (Plate 5.4). This habitat type has the potential to support a specific faunal assemblage not seen elsewhere in the study area. While this habitat type is relatively limited within the study area, it does extend beyond the study area to the south.



Plate 5.1: Rugged gullies and free faces in the north of the study area.



Plate 5.2: Water pool in the east of the study area.



Plate 5.3: Major creekline supporting *Eucalyptus camaldulensis* in the southeastern corner of the study area.





Plate 5.4: Examples of Wona colluvial plain from the southern section of the study area.

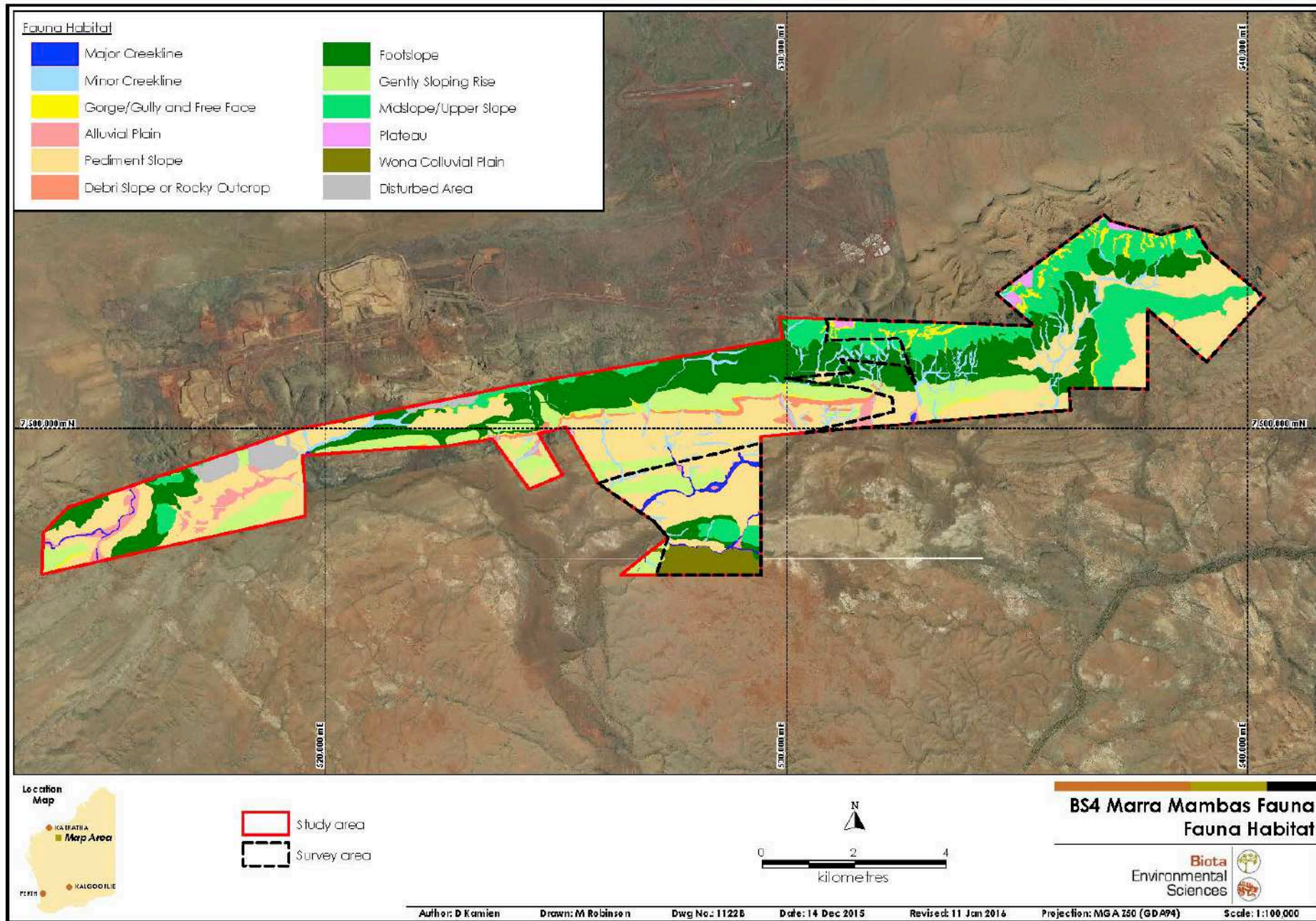


Figure 5.1: Fauna habitats identified in the study area.

5.3 Vertebrate Fauna

The current survey recorded a total of 100 vertebrate fauna species (Table 5.4, see Appendix 5 for site by species matrices). With the inclusion of records from previous surveys conducted within the study area (see Table 4.3), a total of 133 vertebrate fauna species have been recorded within the study area to date (Appendix 6).

Table 5.4: Number of vertebrate fauna species recorded during the current and previous surveys.

Fauna Group	Current Survey	Previous Total for Study Area	Novel Species Added by the Current Survey	Total for Study Area
Amphibians	1	1	1	2
Reptiles	30	31	18	49
Birds	49	44	16	60
Ground-dwelling Mammals	11	4	9	13
Bats	9	4	5	9
Total	100	84	49	133

5.3.1 Herpetofauna

Thirty-one herpetofauna species were recorded during the current survey (Table 5.5), comprising one frog species (Hylidae), four dragon species (Agamidae), four gecko species (Gekkonidae and Diplodactylidae), three legless lizard species (Pygopodidae), 12 skink species (Egerniidae, Eugongylidae and Sphenomorphidae), two monitor species (Varanidae), one python species (Boidae) and four front-fanged snake species (Elapidae). The most numerically abundant reptile species recorded were *Gehyra punctata*, *Ctenotus pantherinus* and *Ctenotus saxatilis*.

A total of 32 species of herpetofauna have previously been recorded within the study area (Table 5.4), with 12 species recorded both previously (Biota 2005) and in the current survey (Table 5.5). A total of 51 species of herpetofauna have been recorded in the study area to date (Table 5.4, Appendix 5). This represents 53% of the total number of potential herpetofauna species for the locality, based on database records and previous surveys in the vicinity (Table 4.4, Appendix 6).

No herpetofauna species of conservation significance were recorded within the study area.

Table 5.5: Herpetofauna species recorded from the survey area.

Family	Species (* = recorded from previous surveys in the study area)	Number Recorded
Hylidae	<i>Litoria rubella</i>	2
Agamidae	<i>Amphibolurus longirostris</i>	3
	<i>Ctenophorus caudicinctus</i> *	4
	<i>Ctenophorus reticulatus</i>	1
	<i>Pogona minor</i> *	3
Diplodactylidae	<i>Diplodactylus conspicillatus</i>	1
	<i>Oedura marmorata</i>	4
Gekkonidae	<i>Gehyra punctata</i>	14
	<i>Gehyra variegata</i> *	1
Pygopodidae	<i>Delma nasuta</i> *	1
	<i>Delma tinctoria</i> *	1
	<i>Lialis burtonis</i> *	2
Egerniidae	<i>Egernia formosa</i>	1
Eugongylidae	<i>Carlia munda</i> *	1
	<i>Carlia triacantha</i>	2
	<i>Cryptoblepharus buchananii</i>	2
	<i>Cryptoblepharus ustulatus</i>	1
	<i>Menetia greyii</i> *	1
	<i>Morethia ruficauda</i>	1

Family	Species (* = recorded from previous surveys in the study area)	Number Recorded
Sphenomorphidae	<i>Ctenotus duricola</i> *	3
	<i>Ctenotus grandis</i> *	5
	<i>Ctenotus leonhardii</i>	1
	<i>Ctenotus pantherinus</i> *	8
	<i>Ctenotus saxatilis</i>	7
Varanidae	<i>Varanus bushi</i>	1
	<i>Varanus tristis</i>	2
Boidae	<i>Antaresia stimsoni</i>	1
Elapidae	<i>Demansia rufescens</i>	1
	<i>Parasuta monachus</i> *	1
	<i>Pseudonaja mengdeni</i>	1
	<i>Suta fasciata</i>	2

5.3.2 Avifauna

Forty-nine species of bird were recorded during the survey (Table 5.6). Species from 28 families were recorded during the survey (Table 5.6). The most abundant species were the Zebra Finch, *Taeniopygia guttata* (n=103), Budgerigar, *Melopsittacus undulatus* (n=81) and the Galah, *Eolophus roseicapillus* (n=71).

Forty-four species of bird have been recorded within the study area previously (Table 5.4), with 33 species recorded during both previous surveys (Biota 2005, 2014) and the current survey. A total of 60 avifauna species have been recorded in the study area to date (Table 5.4, Appendix 6). This represents 42% of the total number of potential bird species for the locality, based on database records and previous surveys in the vicinity (Table 4.4, Appendix 4).

Two bird species of conservation significance have been recorded within the study area to date. The Rainbow Bee-eater, *Merops ornatus* (Schedule 5, Migratory) was recorded during the survey at site MAM03P and was previously recorded at one other location by Biota (2005). In addition, a previous survey within the study area recorded the Fork-tailed Swift, *Apus pacificus* (Schedule 5, Migratory) at one location (Biota 2014).

Table 5.6: Avifauna recorded from the survey area.

Family	Species	Common Name	Total
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon*	25
	<i>Geophaps plumifera</i>	Spinifex Pigeon	19
	<i>Geopelia cuneata</i>	Diamond Dove*	6
Eurostopodidae	<i>Eurostopodus argus</i>	Spotted Nightjar	1
Accipitridae	<i>Elanus axillaris</i>	Black-shouldered Kite	1
	<i>Milvus migrans</i>	Black Kite	1
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel	2
	<i>Falco berigora</i>	Brown Falcon*	2
Otididae	<i>Ardeotis australis</i>	Australian Bustard	2
Turnicidae	<i>Turnix velox</i>	Little Button-quail	2
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah*	71
	<i>Nymphicus hollandicus</i>	Cockatiel	2
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck	7
	<i>Melopsittacus undulatus</i>	Budgerigar*	81
Cuculidae	<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo	8
	<i>Cacomantis pallidus</i>	Pallid Cuckoo*	4
Strigidae	<i>Ninox novaeseelandiae</i>	Southern Boobook	3
Halcyonidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher*	1
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater*	1
Ptilonorhynchidae	<i>Ptilonorhynchus guttatus</i>	Western Bowerbird*	1
Maluridae	<i>Malurus lamberti</i>	Variiegated Fairy-wren*	33
	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren*	4
Acanthizidae	<i>Smicronis brevirostris</i>	Weebill*	20
	<i>Gerygone fusca</i>	Western Gerygone	6
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote	1

Family	Species	Common Name	Total
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater*	26
	<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater*	49
	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater*	2
	<i>Manorina flavigula</i>	Yellow-throated Miner*	31
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater*	2
	<i>Epthianura tricolor</i>	Crimson Chat	12
	<i>Sugomel niger</i>	Black Honeyeater	5
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler*	3
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike*	10
	<i>Lalage sueurii</i>	White-winged Triller*	6
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler*	11
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush*	7
	<i>Oreoica gutturalis</i>	Crested Bellbird*	19
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow*	12
	<i>Artamus minor</i>	Little Woodswallow*	15
	<i>Cracticus nigrogularis</i>	Pied Butcherbird*	4
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail*	25
Corvidae	<i>Corvus orru</i>	Torresian Crow*	2
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark*	2
Petroicidae	<i>Melanodryas cucullata</i>	Hooded Robin*	8
Megaluridae	<i>Eremiornis carteri</i>	Spinifexbird	8
Nectariniidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird*	2
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch*	103
	<i>Emblema pictum</i>	Painted Finch*	33
		Total	702

* = species that were also recorded by previous surveys in the study area

5.3.3 Ground-dwelling Mammals

Eleven ground-dwelling mammal species were recorded during the survey. These comprised four carnivorous marsupials (Dasyuridae), one kangaroo (Macropodidae), three rodents (Muridae), one introduced bovid (Bovidae) and one dog (Canidae) (Table 5.7). The most numerically abundant species recorded were the Long-tailed Planigale (*Planigale ingrami*), Sandy Inland Mouse (*Pseudomys hermannsburgensis*) and the Pilbara Ningau (Ningau *timealeyi*) (Table 5.7). The mammal assemblage recorded within the study area is considered to be typical for the locality.

Four ground-dwelling mammal species have been recorded within the study area previously (Table 5.4), with two of these species recorded by previous surveys (Biota 2005, 2014) as well as the current survey. A total of 13 mammal species have been recorded in the study area to date (Table 5.4, Appendix 6). This represents 39% of the total number of potential mammal species for the locality, based on database records and previous surveys in the vicinity (Table 4.4, Appendix 4).

Table 5.7: Mammal species recorded from the survey area.

Family	Species	Common Name	Total
Dasyuridae	<i>Ningau timealeyi</i>	Pilbara Ningau*	5
	<i>Planigale ingrami</i>	Long-tailed Planigale	6
	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus	1
	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	6
Macropodidae	<i>Osphranter rufus</i>	Red Kangaroo, Marlu	4
Muridae	<i>Mus musculus</i>	House Mouse	2
	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse*	6
	<i>Pseudomys desertor</i>	Desert Mouse	4
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	6
Canidae	<i>Canis familiaris dingo</i>	Dingo	1
Bovidae	<i>Bos taurus</i>	European Cattle	1
		Total	42

* = species also recorded by previous surveys in the study area.

One ground-dwelling mammal species of conservation significance was recorded during the survey; the Priority 4 Western Pebble-mound Mouse (*Pseudomys chapmani*). One individual was trapped at site MAM01P and five mounds (four active, one inactive) were recorded opportunistically (Table 5.8). This species has been recorded previously within the study area (Biota 2013c, Astron 2014).

Table 5.8: Western Pebble-mound Mouse records from the 2015 survey.

Record type	Easting (mE)	Northing (mN)
Individual (MAM01P)	539131	7503381
Active mound	528837	7497624
Active mound	533537	7501507
Active mound	537313	7502690
Active mound	526512	7500226
Inactive mound	539185	7503011

5.3.4 Bats

Nine bat species were recorded during the survey (Table 5.9), comprising one species of Hipposideridae, one species of Megadermatidae, three species of Vespertilionidae, two species of Molossidae and two species of Emballonuridae. Four bat species had previously been recorded within the study area (Biota 2013a, 2013c). This represents 60% of the bat species with potential to be recorded in the vicinity of the study area (Table 4.3, Appendix 4).

Two species of bat of conservation significance, the Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*) and the Ghost Bat (*Macroderma gigas*), were recorded during the survey (Table 5.9). The timing and activity levels at all sites indicate that the Pilbara Leaf-nosed Bats recorded were foraging away from a roost site (Appendix 3). The Pilbara Leaf-nosed Bat has been recorded previously within the study area (Biota 2013c).

Table 5.9: Bat species recorded in the survey area, presented by site and activity levels.
(Call numbers presented for conservation significant species.)

Species (Common Name)	Site					
	MAMBAT 54-01	MAMBAT 54-02	MAMBAT 81-01	MAMBAT 81-02	MAMBAT 93-01 Ψ	MAMBAT 93-02
<i>Rhinonictis aurantia</i> (Pilbara Leaf-nosed Bat)	Low (4 calls)		Low (2 calls)	Low (7 calls)	-	Low (38 calls)
<i>Macroderma gigas</i> (Ghost Bat)					-	Low (1 call)
<i>Taphozous georgianus</i> (Common Sheath-tailed Bat)	High	Low	High	Medium	-	Low
<i>Taphozous hilli</i> (Hill's Sheath-tailed Bat)		Low				
<i>Chalinolobus gouldii</i> * (Gould's Wattled Bat)	Low	Low	Low	High	-	High
<i>Scotorepens greyii</i> * (Little Broad-nosed Bat)	Low		Low	High	-	Medium
<i>Vespadelus finlaysoni</i> * (Inland Cave Bat)	High	Low	Low	High	-	High
<i>Chaerephon jobensis</i> (Greater Northern Free-tailed Bat)	Low	Low	Low	Low	-	Low
<i>Ozimops lumsdenae</i> (Northern Free-tailed Bat)	Low	Low		Medium	-	High

* = recorded from previous surveys in study area.

Ψ = detector failed to record at this site.

5.4 Species Accumulation Analysis

Species accumulation curves are presented for groundfauna (mammals and reptiles) (Figure 5.2) and avifauna (Figure 5.3) recorded from the current survey only. In each figure, the observed increase in species recorded is presented alongside the randomised values. For both groundfauna and avifauna, the raw trapping/census data are presented with and without opportunistic records included.

5.4.1 Ground Fauna

The groundfauna species accumulation curves presented in Figure 5.2 has not yet approached an asymptote, suggesting that a number of additional species are likely to be recorded with continued sampling effort. Indeed, the species richness estimators indicate that the observed species richness is well below that predicted for the study area (Table 5.10). Comparison of the observed number of groundfauna species recorded ($n=31$) with an average of the species richness estimators (approximately 43 species) presented in Table 5.10 predict that approximately 71% of the trappable groundfauna species present were recorded during the survey.

The observed increase in the number of species appears to plateau early during the survey before increasing again over the final two days. The reasons for this are not clear; it may be a result of stochastic factors but may also be attributable to a decrease in temperatures between the third and sixth day of the survey (see Section 3.2).

Figure 5.2 presents the number of species recorded with and without inclusion of the opportunistic fauna records. The difference between the curves for these data highlights the importance of opportunistic search methods in increasing the number of species recorded. In the current survey, opportunistic recordings increased the observed number of species from 31 to 44 species (an increase of approximately 30%). The majority of new species recorded opportunistically were recorded during the nocturnal survey on the fourth day of the survey.

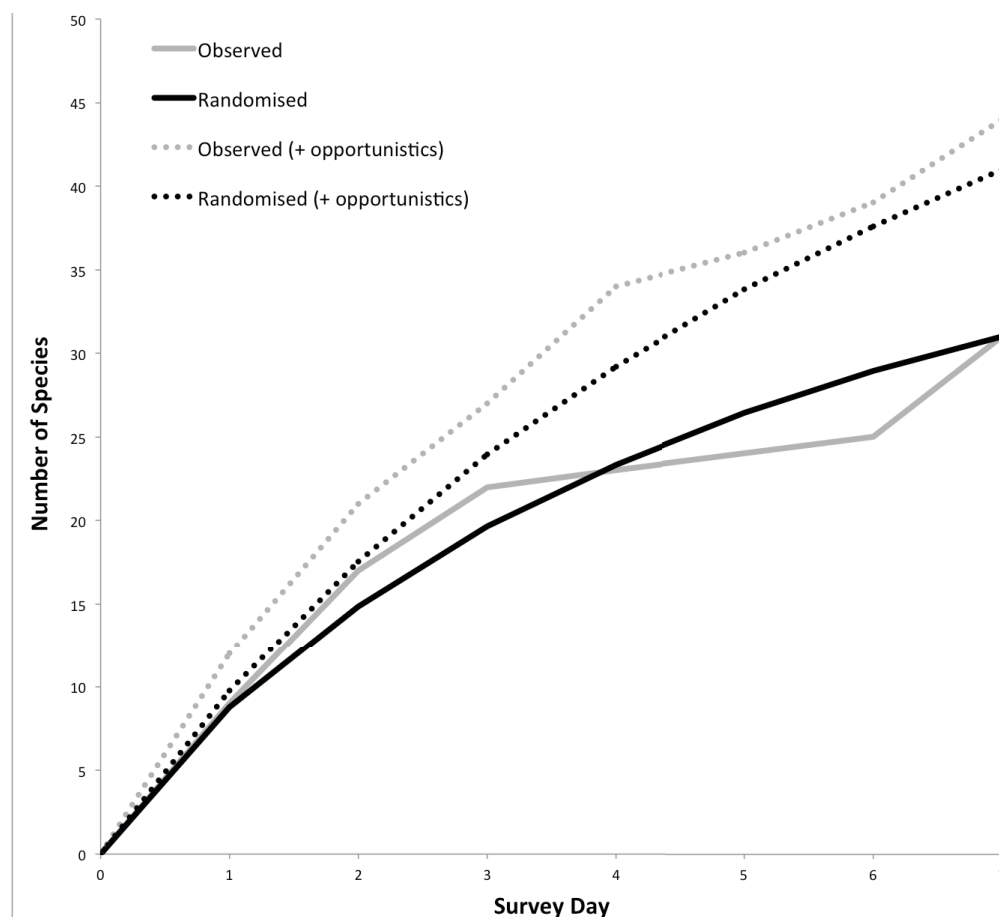


Figure 5.2: Observed and randomised species accumulation curves for groundfauna recorded. "+ opportunistics" indicates the inclusion of opportunity fauna records.

Table 5.10: Recorded groundfauna species richness compared with predicted species richness (without opportunistic records).

	Species Observed	Species Richness Indicator			
		Chao 1	Jackknife 1	Bootstrap 1	Average of Estimates
Trap records	31	49.75	43.86	36.93	43.51
Trap + opportunistic records	44	64	65	53.46	64.5

5.4.2 Avifauna

The species accumulation curve for avifauna recorded appears to be reaching an asymptote (Figure 5.3). Based on the number of species recorded (excluding opportunistic records), and the species richness estimators prediction of an average number of approximately 54 species, the survey recorded approximately 87% of the avifauna predicted to occur (Table 5.11). In contrast to the species accumulation curve for groundfauna (Figure 5.3), including the opportunistic recordings of avifauna did not significantly increase the number of species recorded for the study area (Table 5.11).

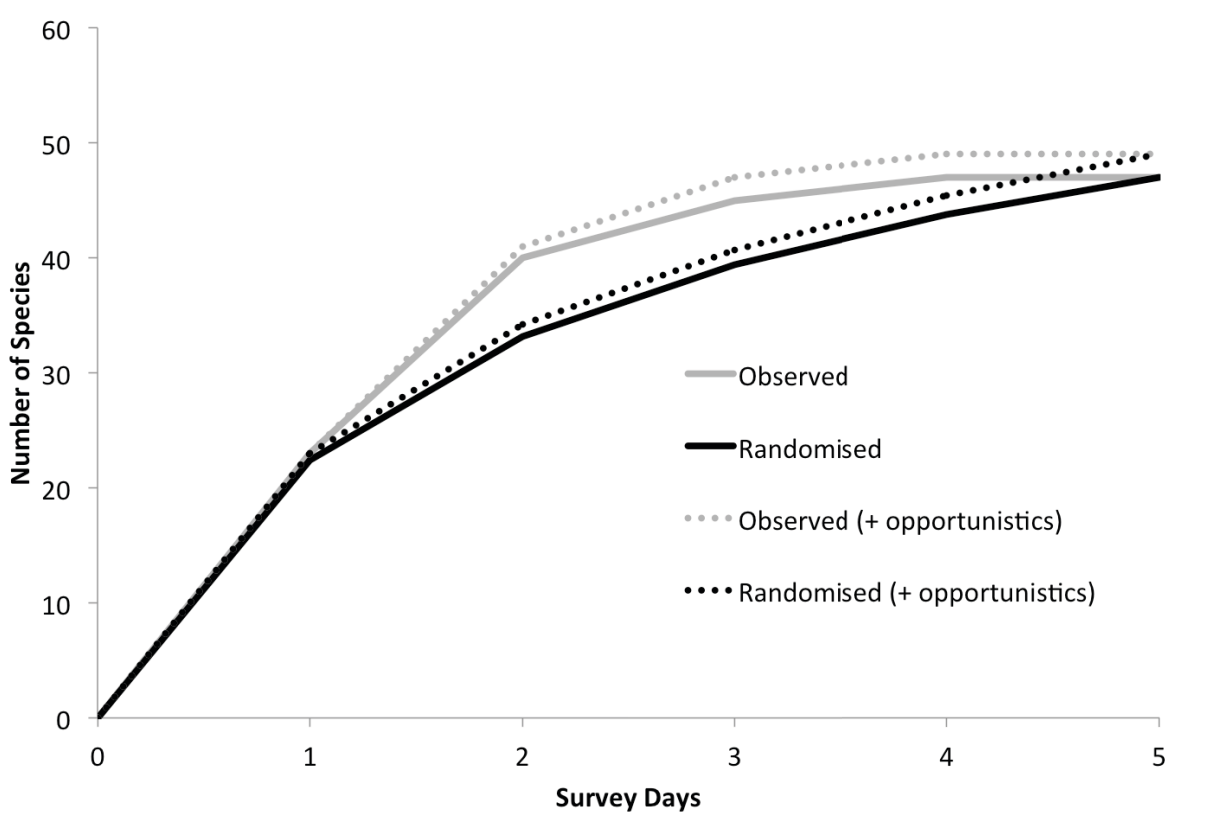


Figure 5.3: Observed and randomised species accumulation curves for avifauna recorded. "+ opportunistics" indicates the inclusion of opportunity fauna records.

Table 5.11: Recorded avifauna species richness compared with predicted species richness (without opportunistic records).

	Species Observed	Species Richness Indicator			
		Chao 1	Jackknife 1	Bootstrap 1	Average of Estimates
Census records	47	49.72	59.8	53.24	54.25
Census + opportunistic records	49	51.45	63.4	55.83	57.43

5.4.3 Comparison with Previous Surveys

Although additional species are likely to be recorded as a result of further seasonal sampling in the survey area, the total number of species recorded from the study area as a whole is comparable to other surveys in the vicinity (Table 5.12).

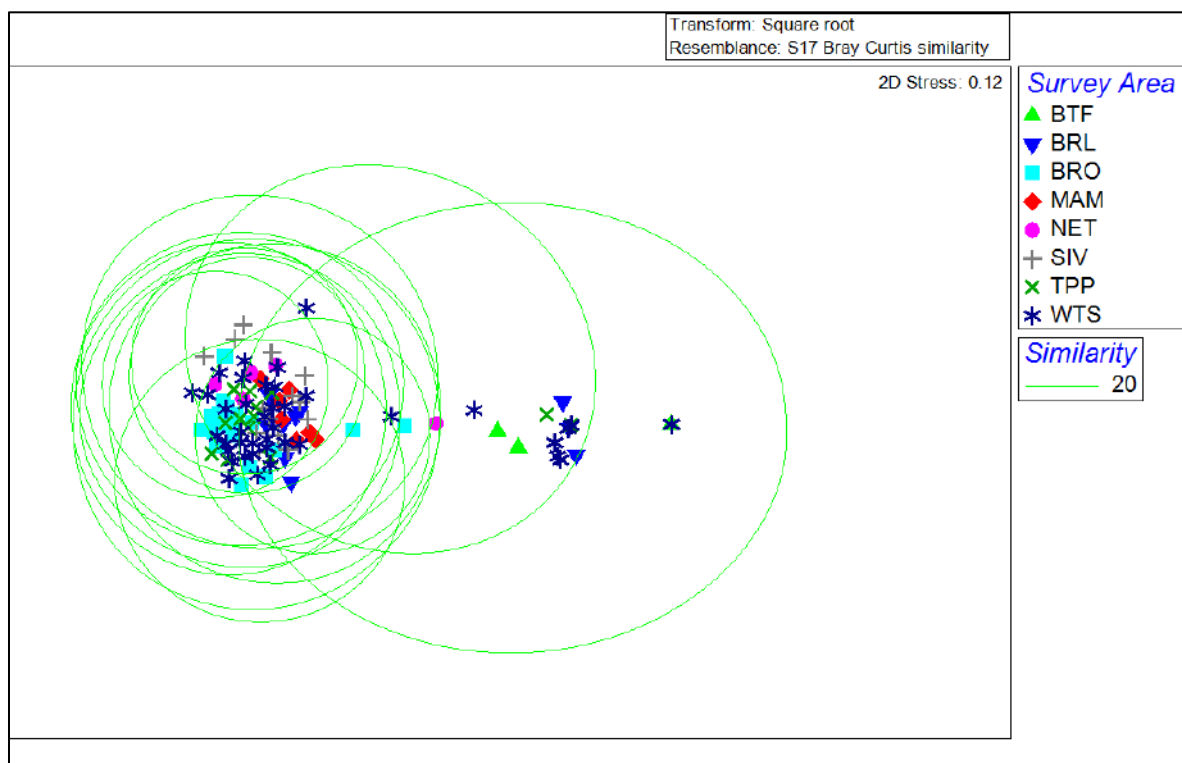
Table 5.12: Comparison of number of species recorded with previous surveys.

Fauna Group	Current Survey Single phase	Beasley River (Biota 2009e) Single phase	Brockman 4 (Biota 2005) Two phases	Total for Study Area Combined dataset
Amphibians	1	1	2	2
Reptiles	30	29	54	49
Birds	49	45	83	60
Ground-dwelling Mammals	11	8	13	13
Bats	9	6	7	9
Total	100	89	159	133

5.5 Contextual Analysis

5.5.1 Groundfauna

Comparison of the faunal assemblages recorded from the study area and from previous surveys in the locality revealed a significant level of overlap in the species recorded. Based on the faunal assemblages recorded, no distinct groupings can be detected based on survey area (Figure 5.4; see Section 3.5.3 for an explanation of the survey area codes). This indicates that the faunal assemblage recorded from the current study area (MAM) does not appear to differ from that recorded from other survey areas in the locality. The cluster analysis dendrogram for groundfauna assemblages is presented in Appendix 7.

**Figure 5.4: NMDS plot of groundfauna recorded from surveys conducted within 50 km of the study area.**

Analysis of the faunal assemblages based on the method of sampling rather than survey area was found to provide a clearer grouping, with the data clustering more tightly as a result of the type of trapping method employed, rather than the area surveyed (Figure 5.5). This is likely to be due to the different trap types being more suited to trapping particular species / fauna groups (e.g. funnel traps are more likely to capture reptile species, whereas Elliott traps are more likely to capture the larger body-weight mammal species).

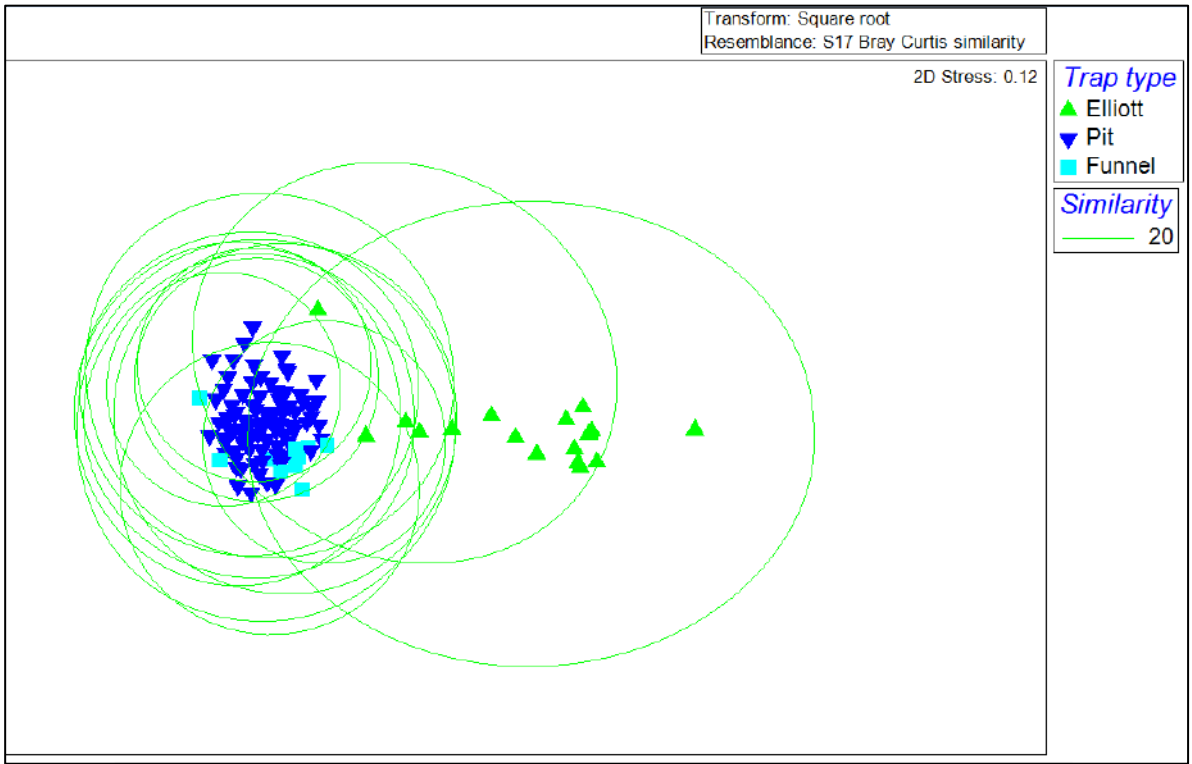


Figure 5.5: NMDS plot of groundfauna recorded from surveys conducted within 50 km of the study area, grouped by sampling method.

5.5.2 Avifauna

Comparison of the avifauna assemblage recorded within the study area with those recorded from previous surveys in the locality showed a high level of overlap, demonstrating that the assemblages recorded do not appear to form any distinct groupings based on survey area (Figure 5.6). See Appendix 7 for the cluster analysis dendrogram for avifauna assemblages.

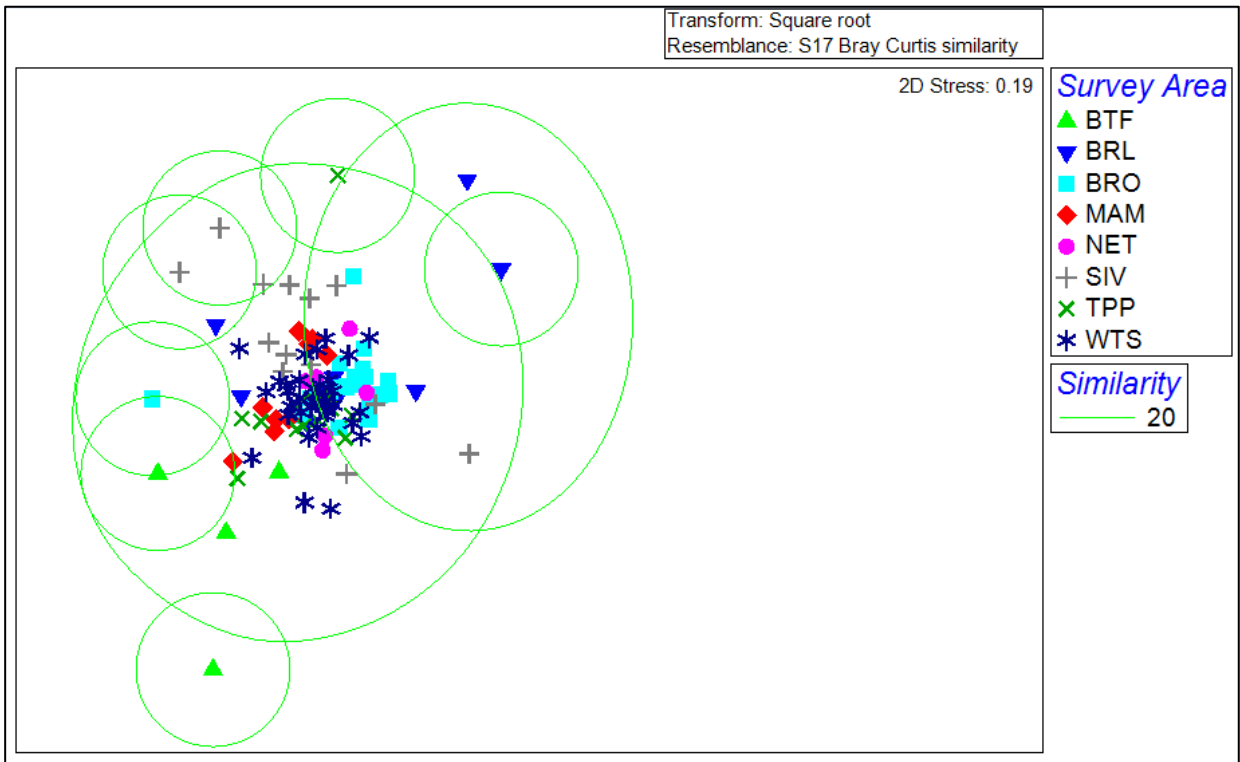


Figure 5.6: NMDS plot of avifauna recorded from surveys conducted within 50 km of the study area.

5.6 SRE Invertebrate Fauna

5.6.1 Current Survey

A total of 41 live invertebrate specimens from two groups known to contain SRE species were recorded during the current survey. These comprised four mygalomorph spiders and 37 land snails.

The invertebrate fauna recorded from the survey are currently considered to represent potential SREs based on the criteria outlined in Table 3.8. Comments on the potential wider distributions of the recorded fauna are difficult to make without molecular sequencing (discussed further in Section 8.3).

5.6.1.1 Mygalomorph Spiders

Four mygalomorph spiders representing three morphospecies from two families (Barychelidae and Nemesiidae) were recorded from three sites (Table 5.13, Figure 5.7). Molecular analysis has not been conducted and therefore these specimens have not been identified to species level. Informal working names, derived from burrow and gross morphology features, are used here in lieu of species determination.

Table 5.13: Mygalomorph spiders recorded during the survey.

Site	Field Code	Easting (mE)	Northing (mN)	Morphospecies
MAMSRE01	M20150806MAMSRE01-01	534504	7501295	Barychelidae sp.
MAMSRE02	M20150806MAMSRE02-01	528675	7498116	Nemesiidae sp. 'sock'
MAMSRE04	M20150807MAMSRE04-01	539102	7503415	<i>Aname</i> sp. 'hooded'
MAMSRE04	M20150807MAMSRE04-02	539083	7503404	<i>Aname</i> sp. 'hooded'

Barychelidae

One individual of Barychelidae sp. was recorded from site MAMSRE01 in open mulga woodland on stony footslopes. Burrow morphology was lidded and well camouflaged (Table 5.15).

Nemesiidae

One individual of Nemesiidae sp. 'sock' was recorded from site MAMSRE02, on a pediment slope. Burrow morphology consisted of a small dirt mound covering a sock-like entrance (Table 5.15).

Two *Aname* sp. 'hooded' were recorded from site MAMSRE04, in scattered *Acacia xiphophylla* on a pediment slope. Burrow morphology typically consisted of a silk opening, which was curved horizontally to form a hood (Table 5.15).

5.6.1.2 Land Snails

A total of 37 live land snail specimens were recorded from four sites during the survey (Table 5.14, Figure 5.7). Additionally, numerous shells of dead snails were observed throughout the study area.








Table 5.14: Land snails recorded during the survey.


Site	Number of Specimens	Easting (mE)	Northing (mN)	Morphospecies
MAMSRE02	15	528965	7497386	<i>Rhagada</i> sp. 'banded'
MAMSRE03	6	528637	7498040	<i>Rhagada</i> sp. 'banded'
MAMSRE09	11	536934	7502153	<i>Rhagada</i> sp. 'banded'
MAMSRE11	5	539726	7503452	<i>Rhagada</i> sp. 'banded'

Camaenidae

Based on morphology, all of the land snail specimens recorded are thought to belong to the genus *Rhagada*. However, definitive identification to species level is not possible without molecular sequencing (Z. Hamilton, pers. comm., October 2015). Specimens were recorded from beneath large hummocks of *Triodia* species that fringed minor drainage lines and alluvial plains.

Table 5.15: Invertebrate fauna recorded from the study area.

Group Family	Morphospecies	Burrow image	Specimen image
Mygalomorph Spiders			
Barychelidae	Barychelidae sp.		
	Nemesiidae sp. 'sock'		
Nemesiidae	<i>Aname</i> sp. 'hooded'	<p>Photo not taken. Burrow morphology was similar to photo below but burrow entrance was less well defined.</p>	
	<i>Aname</i> sp. 'hooded'		

Group Family	Morphospecies	Burrow image	Specimen image
Land Snails			
Camaenidae	<i>Rhagada</i> sp.	N/A	

5.6.2 Previous Surveys

Early surveys at BS4 recorded the undescribed taxon *Rhagada* sp. 'Mt Brockman' (Biota 2005). Based on further collections and molecular work, this was later split into three *Rhagada* sp. lineages ('Beasley', 'Tom Price' and 'Panna') (Biota 2013a). Further analysis suggests that the 'Beasley' and 'Tom Price' lineages are essentially a single interbreeding taxon, whilst the 'Panna' lineage likely represents a unique taxon.

Biota's (2013a) survey recorded a similar assemblage of invertebrate fauna to that from the current survey, with two putative Nemesiid species (*Aname* spp. 'N19' and 'N126'), the *Rhagada* sp. lineages 'Tom Price/Beasley' and 'Panna' and two pseudoscorpion species collected. Of these, collections of *Aname* sp. 'N126' (deemed unlikely to be an SRE) and the *Rhagada* 'Tom Price/Beasley' lineage lie within the study area. According to the spatial definition of an SRE (Harvey 2002), both *Rhagada* lineages/taxa are considered to be SREs but have distributions that extend well beyond the current Marra Mambas study area (Biota 2013a).

The *Rhagada* land snail and mygalomorph spider taxa recorded from the study area are presented in Figure 5.7 and Figure 5.8, respectively, together with other records from the vicinity of the study area.

5.7 Short Range Endemic Fauna Habitat

Mountain ranges and isolated mesas are considered to represent the best niche for moisture conservation in arid and semi-arid Australia (Slatyer et al. 2007) due to the following features, which provide refugia for potential SRE invertebrate fauna in a number of ways:

- Leaf litter accumulation
Deep leaf litter is able to accumulate within sheltered gorges protected from fire and run-off, providing a moist microhabitat for many potential SRE invertebrate groups.
- Deep rock fractures
Deep rock fissures and pockets of deep soil within gorges and gullies provide key microhabitats for SRE fauna by providing shelter from wind and sunlight, thereby reducing the risk of desiccation.
- Elevated topography
Areas of elevated topography are typically less prone to clearing and grazing (Slatyer et al. 2007). In addition, scree slopes can impede the spread of fires (Slatyer et al. 2007).
- Soil accumulation
The depth of soil found on alluvial valley floors and drainage basins provides a suitable substrate for invertebrates such as mygalomorph spiders and scorpions, which burrow below ground.

It is important to note that habitat preferences for the majority of SRE fauna are typically at the microhabitat level. Preferred microhabitats may exist across a range of landforms, if features which provide shelter from exposure and promote moisture conservation (for example, rock piles or leaf litter accumulations) are present that are absent from the surrounding landscape.

The potential SRE fauna recorded from the current survey were not recorded from landforms or habitat types that are considered to be rare or of conservation significance. The land snail specimens were recorded from beneath large *Triodia* spp. hummocks fringing drainage lines; while offering a protected microhabitat amidst exposed terrain, this is not an uncommon or restricted habitat either within or beyond the study area. Similarly, the mygalomorph spider records from the current survey were from a range of landforms types (alluvial floodplains, footslopes and stony lower slopes) that were not considered to be of significance. Whilst the reliance on refugial microhabitats is a key feature of the majority of relictual SREs, mygalomorph spiders are less dependent on refugial habitats due to their ability to construct their own burrows below ground, thereby creating their own microhabitats. As a result of this, they may be found across different landform features, as was the case in this survey.

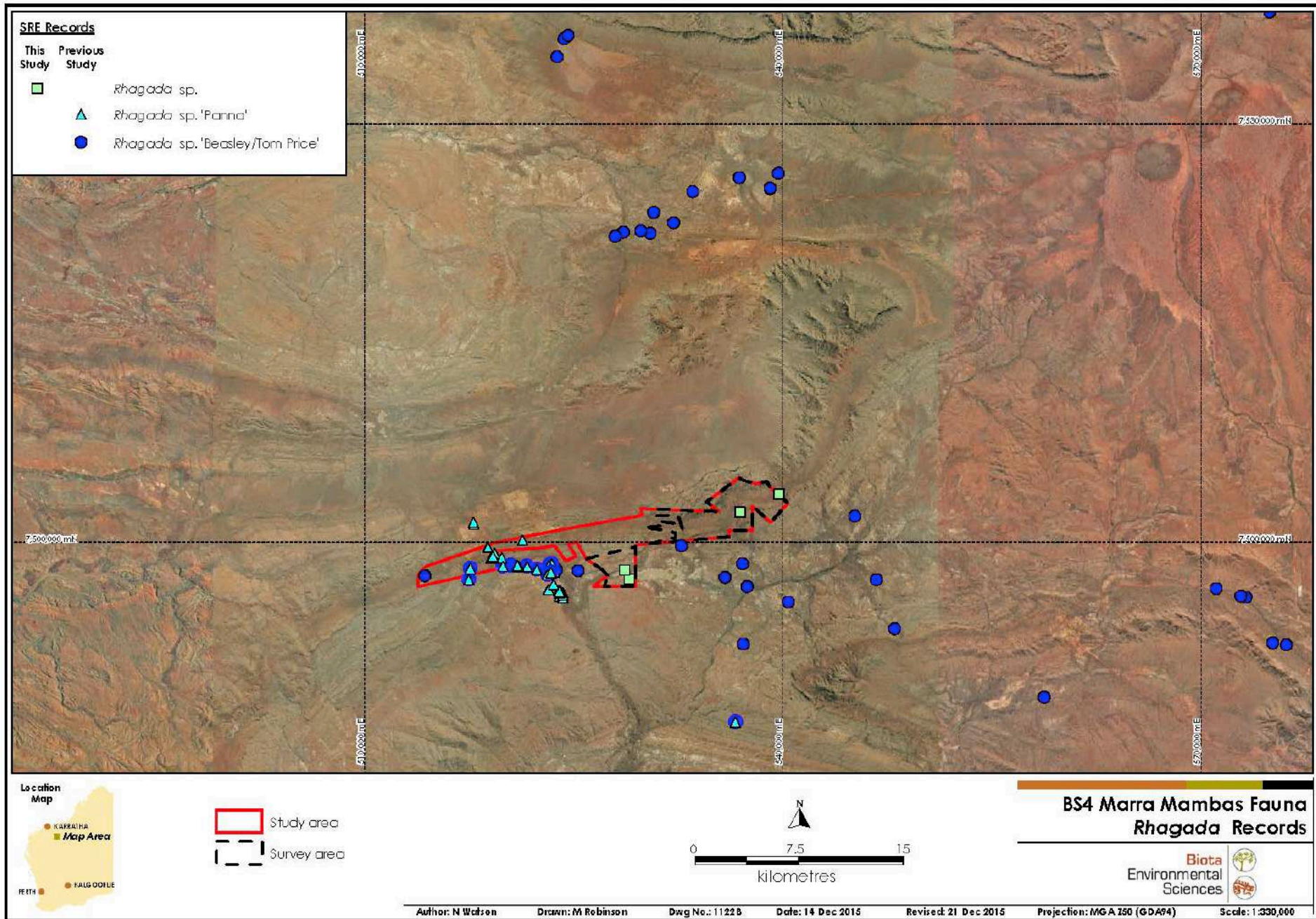


Figure 5.7: *Rhagada* sp. records from the study area and surrounds.

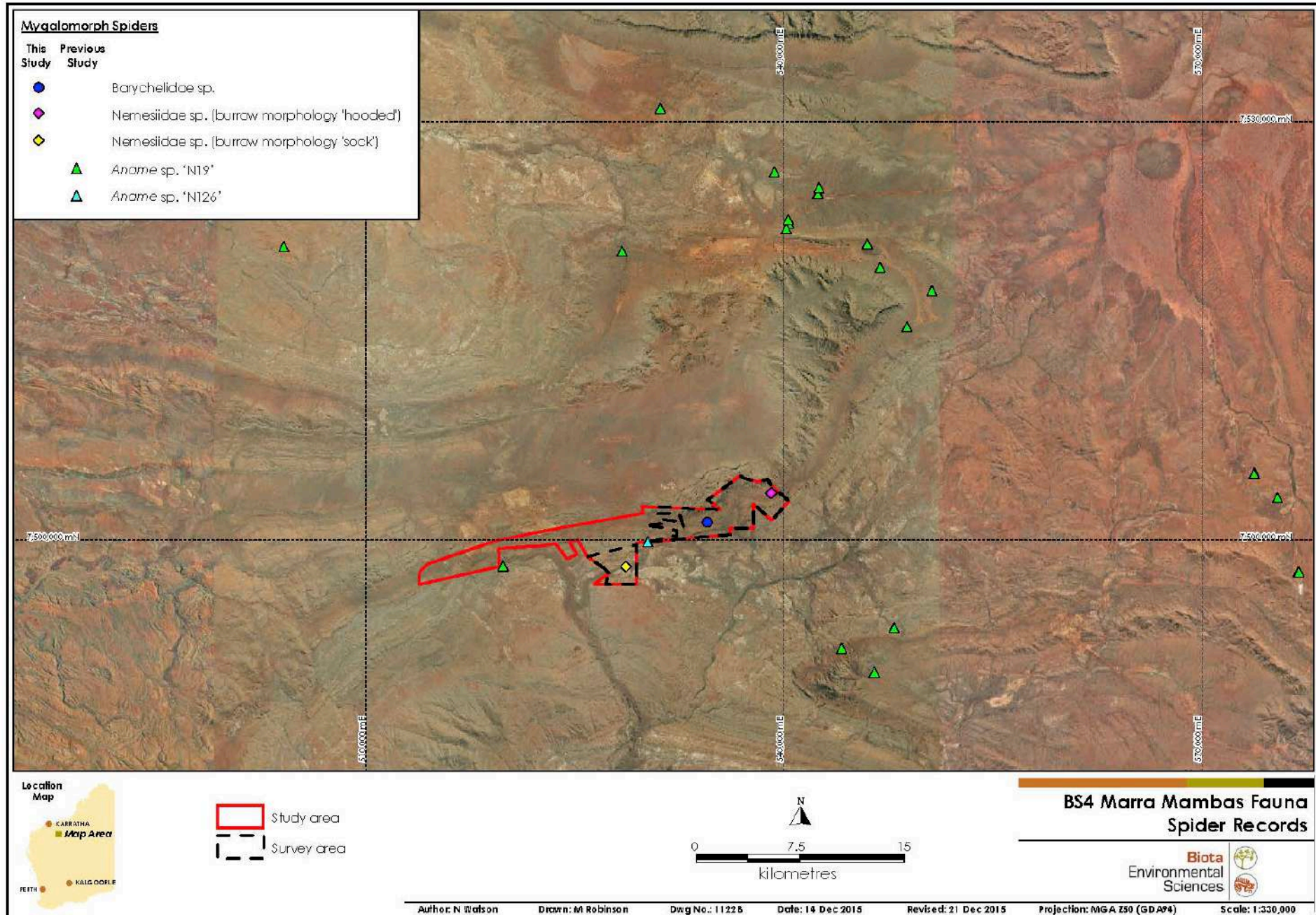


Figure 5.8: Mygalomorph spider records from the study area and surrounds.

6.0 Conservation Significance

6.1 Conservation Significant Vertebrate Fauna Recorded from the Study Area

Five species of conservation significance have been recorded to date in the study area, one of which (the Ghost Bat) was first recorded during the 2015 survey:

- Pilbara Leaf-nosed Bat, *Rhinonictoris aurantia* (Schedule 3, Vulnerable);
- Ghost Bat, *Macroderma gigas* (Schedule 3, Vulnerable);
- Western Pebble-mound Mouse, *Pseudomys chapmani* (Priority 4);
- Rainbow Bee-eater, *Merops ornatus* (Schedule 5, Migratory); and
- Fork-tailed Swift, *Apus pacificus* (Schedule 5; Migratory).

These species are discussed in further detail in Sections 6.1.1 to 6.1.4. The distribution of conservation significant vertebrate species recorded within and in close proximity to the study area, as well as in the broader locality, are presented in Figure 6.1 and Figure 6.2 respectively.

6.1.1 Pilbara Leaf-nosed Bat, *Rhinonictoris aurantia* (Schedule 3, Vulnerable)

Distribution: While *Rhinonictoris aurantia* occurs from the Pilbara region in Western Australia to Queensland, the Pilbara form is geographically restricted to the Pilbara and Gascoyne bioregions by a wide expanse of desert (DSEWPaC 2008). Colonies are scattered throughout the landscape and are known from mines of the eastern Pilbara, throughout the Hamersley Range and from sandstone formations south of the Hamersley Range (Department of the Environment 2015a). Confirmed collections, sightings or records of roost sites have come from Red Hill Station, Turee Creek Station, Klondyke Queen gold mine near Marble Bar, Karratha, Millstream, Tom Price-Marandoo, Comet mine, Bamboo Creek, Copper Hills (near Nullagine) and the Barlee Range Nature Reserve.

Ecology: The Pilbara Leaf-nosed Bat is an opportunistic feeder on moths and beetles throughout the year, as well as flying termites during the wet season. Mating occurs in July, followed by a gestation period of five months with single young born in December or January (Churchill 2008). The Pilbara Leaf-nosed Bat is a poor thermoregulator and is very susceptible to dehydration. For this reason it requires deep caves, small crevices within deep caves or horizontal mine shafts that have stable, warm and humid microclimates for permanent roost sites (Department of the Environment 2015a). For the Pilbara Leaf-nosed Bat, these parameters are 28-32°C and 96-100% humidity during the dry season (Churchill 2008).

The species is known to have a typical dry season foraging range of 15 to 20 km from its primary roost (Bullen 2013). It does forage at greater distances if suitable water sources are available to prevent dehydration. It also appears to range nomadically from these roosts when wet season conditions allow it to use other caves, but then returns to its primary roosting location during the dry season. It is not known if these foraging ranges apply equally to males and females.

Occurrence in Study Area: The Pilbara Leaf-nosed Bat was recorded at four sites during the 2015 survey, all of which were located along the face of the Marra Mamba hills in the southeastern portion of the study area. This species had previously been recorded by Biota (2014) on the stony hill slopes of the Brockman Range in the central portion of the study area (Figure 6.1), and has also been recorded in the vicinity of the study area (Figure 6.2). All records of the Pilbara Leaf-nosed Bat have been categorised as 'low activity' (the maximum number of calls per night was 38), and as foraging away from a roost site (Appendix 3). As there are no known roosts within foraging distance of these records, it is likely that there is an undiscovered roost situated within 15 to 20 km of the recordings made during the survey. Within the study area, Pilbara Leaf-nosed Bats would be expected to forage along free faces, major creeklines and gorges, and over low hills and plains.

6.1.2 Ghost Bat, *Macroderma gigas* (Schedule 3, Vulnerable)

Distribution: This species was previously distributed across most of inland and northern Australia, but is now restricted to the tropical north of the continent (Churchill 2008). It occurs in a broad range of habitats, with distribution being influenced by the availability of suitable caves and mines for roost sites (Churchill 2008). The distribution of Ghost Bats is fragmented, with each population showing some genetic differentiation (Armstrong and Wilmer 2004, Biota 2004). Populations in the Pilbara bioregion appear to be isolated from those in the Kimberley and Northern Territory. A study by McKenzie and Bullen (2009) found that the Ghost Bat is more common than previously thought.

Ecology: Ghost Bats are efficient predators of small birds, mammals, reptiles and large insects, and they have highly developed echolocation, visual and hearing systems (Churchill 2008). Vocalisations audible to humans are used in their complex social interactions (Churchill 2008). Bats forage over large distances, with ranges of ~60 ha, and the size of their foraging area is probably inversely related to the productivity of their landscape. Bats are known to have overlapping ranges (Churchill 2008). Scat material from *M. gigas* is quite distinctive and can be used to identify temporary roosts or feeding sites.

Occurrence in Study Area: The Ghost Bat was recorded in the study area for the first time during the current survey, with a single call of this species recorded at the eastern end of the study area (Figure 6.1; Appendix 3). This species had been recorded previously in the vicinity of the study area (Figure 6.2) and considerable suitable habitat (gorges, gullies and free faces) exists within the study area for the species.

6.1.3 Western Pebble-mound Mouse, *Pseudomys chapmani* (Priority 4)

Distribution: This species is endemic to the central and eastern parts of the Pilbara including Karijini National Park (Menkhorst and Knight 2011).

Ecology: The Western Pebble-mound Mouse is typically found on stony hillsides with hummock grasslands (Menkhorst and Knight 2011) and is common to very common in suitable habitat within the Hamersley and Chichester subregions of the Pilbara bioregion. It is well known for its behaviour of constructing extensive mounds of small stones covering areas from 0.5 to 9.0 square meters (van Dyck and Strahan 2008). This mound formation is most common on spurs and gentle slopes where suitable sized stones are present.

Occurrence in Study Area: One individual was captured during the survey at site MAM01P on a stony pediment slope, and five mounds were recorded in the study area in similar habitat ranging up to mid-slopes of hills (Figure 6.1). The Western Pebble-mound Mouse has been recorded on pediment slopes, footslopes and gently sloping rises throughout the study area on previous surveys (Figure 6.1), as well as in the broader locality (Figure 6.2).

6.1.4 Rainbow Bee-eater, *Merops ornatus* (Schedule 5, Migratory)

Distribution: The Rainbow Bee-eater occurs through the majority of the western third of Western Australia, usually where free water is readily available.

Ecology: This species forages aerially for insects and nests in burrows in the ground (Johnstone and Storr 1998). It occurs in a variety of habitats that are generally well watered and lightly wooded, with suitable (sandy) soil for nesting and a tall stratum of vegetation for perching.

Occurrence in Study Area: One Rainbow Bee-eater was recorded during the 2015 survey, from an alluvial plain flanking a minor creekline in the central portion of the study area (Figure 6.1). Two individuals were previously recorded by Biota (2005) from another location to the north, on a footslope surrounded by minor creeklines. This species is considered to be locally common (Figure 6.2).

6.1.5 Fork-tailed Swift, *Apus pacificus* (Schedule 5; Migratory)

Distribution: Fork-tailed Swifts are thought to be exclusively aerial in Australia as they breed in the northern hemisphere, migrating south to the Australasian region from October to April. The species is an irregular summer visitor to the Pilbara from November to early April (Johnstone et al. 2013). Consequently, Fork-tailed Swifts do not rely on terrestrial habitats, but are likely to overfly areas of the Pilbara.

Ecology: The Fork-tailed Swift is most often observed following thunderstorms and cyclonic weather patterns and the associated emergence of invertebrate fauna, which are a food source for this species (Johnstone et al. 2013).

Likelihood of Occurrence: The Fork-tailed Swift was recorded over-flying a minor creekline in the central portion of the study area during a recent survey (Biota 2014) (Figure 6.1). This species is considered to be locally uncommon (Figure 6.2) but would not be restricted to the study area.

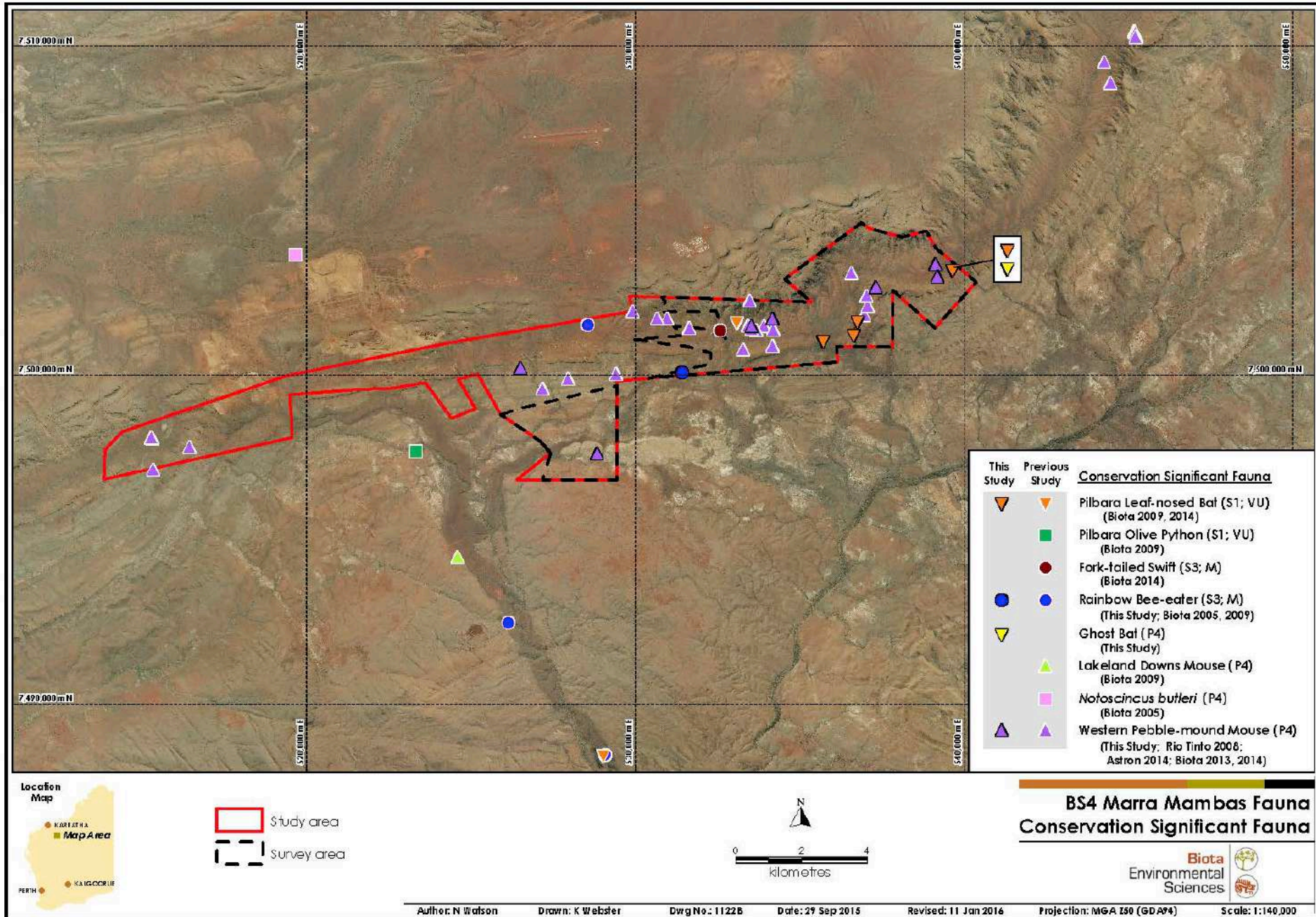


Figure 6.1: Locations of conservation significant fauna recorded in and around the study area.

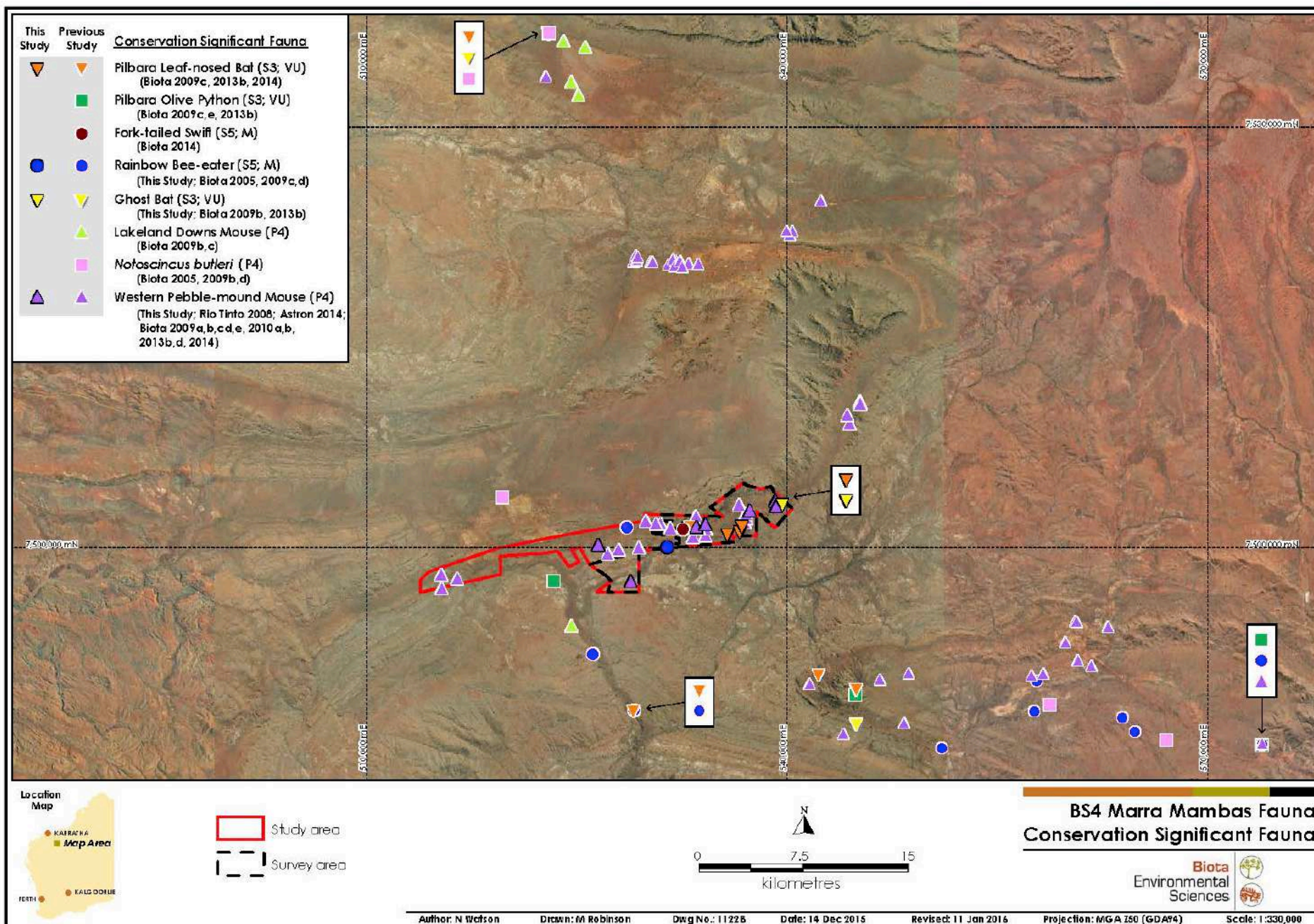


Figure 6.2: Conservation significant fauna recorded within 40 km of the study area.

6.2 Likelihood of Occurrence of Other Conservation Significant Fauna in the Study Area

Nineteen conservation significant fauna species were identified through the desktop assessment of data from the locality, and five of these species have been recorded from the study area (Section 6.1). The likelihood that the remaining 14 species would occur in the study area was reassessed following the field survey (see Section 3.1.3 for discussion of the ranking categories). None of the likelihood rankings were changed from those assigned during the desktop assessment (see Section 4.7.2.1).

On this basis:

1. The following species are still considered likely to occur in the study area:
 - Pilbara Olive Python, *Liasis olivaceus barroni* (Schedule 3, Vulnerable);
 - Lined Soil-Crevice Skink, *Notoscincus butleri* (Priority 4); and
 - Short-tailed Mouse, *Leggadina lakedownensis* (Priority 4).
2. The following species are considered to have the potential for occurrence:
 - Long-tailed Dunnart, *Sminthopsis longicaudata* (Priority 4); and
 - Peregrine Falcon, *Falco peregrinus* (Schedule 7).
3. The following species are considered unlikely to occur in the study area:
 - Northern Quoll, *Dasyurus hallucatus* (Schedule 2, Endangered); and
 - Bilby, *Macrotis lagotis* (Schedule 3, Vulnerable).
4. The following species would not occur in the study area:
 - Northern Marsupial Mole, *Notoryctes caurinus* (Priority 4).

Each species listed above is discussed in terms of its distribution, ecology and likelihood of occurrence in Sections 6.3 to 6.6.

The following migratory bird species were also returned from the database searches, but are considered unlikely to occur within the study area and are not discussed further beyond Table 6.1:

- Cattle Egret, *Ardea ibis* (Schedule 5, Migratory);
- Eastern Great Egret, *Ardea modesta* (Schedule 5, Migratory);
- Oriental Plover, *Charadrius veredus* (Schedule 5, Migratory);
- Common Sandpiper, *Actitis hypoleucos* (Schedule 5, Migratory);
- Swinhoe's Snipe, *Gallinago megala* (Schedule 5, Migratory); and
- Australian Painted Snipe, *Rostratula australis* (Schedule 5, Migratory).

Table 6.1: Conservation significant vertebrate fauna known from the locality and their likelihood of occurrence in the study area based on the field survey findings.

Family	Species	Common Name	Conservation Status		Preferred Habitat	Habitat in Study Area?	Records Within 40 km?	Likelihood of Occurrence in the Study Area
			Commonwealth	State*				
Avifauna								
Ardeidae	<i>Ardea ibis</i>	Cattle Egret	Migratory	S5	Well-watered areas such as damp pastures and wetlands; not common in arid areas.	✓	✗	Unlikely to occur
	<i>Ardea modesta</i>	Eastern Great Egret	Migratory	S5	Shallow fresh water such as river pools, lakes, large dams and sewage ponds.	✓	✗	Unlikely to occur
Charadriidae	<i>Charadrius veredus</i>	Oriental Plover	Migratory	S5	Open plains, rolling country, muddy or sandy wastes near inland swamps or tidal mudflats, bare claypans, margins of coastal marshes, grassy airfields, lawns and coastal dunes.	✗	✗	Unlikely to occur
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	Migratory	S5	Fresh and salt marshes, lakes, streams, sheltered coasts.	✗	✗	Unlikely to occur
	<i>Gallinago megala</i>	Swinhoe's Snipe	Migratory	S5	Shallow freshwater wetlands, fields, sewage farms.	✗	✗	Unlikely to occur
Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	Migratory	S2	Shallow, brackish or freshwater terrestrial wetlands.	✗	✗	Unlikely to occur
Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon		S7	Wide range of habitats including forest, woodlands, wetlands and open country.	✓	✗	May potentially occur
Herpetofauna								
Boidae	<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	Vulnerable	S3	Rocky areas in the Pilbara, showing a preference for habitats near water, particularly rock pools.	✓	✓	Likely to occur
Sphenomorphidae	<i>Notoscincus butleri</i>	Lined Soil-Crevise Skink		P4	Areas dominated by <i>Triodia</i> spp. near creek and river margins.	✓	✓	Likely to occur
Mammals								
Dasyuridae	<i>Dasyurus hallucatus</i>	Northern Quoll	Endangered	S2	Rocky habitats, ridges and free faces, particularly in contact with dense vegetation along drainage areas.	✓	✗	Unlikely to occur
	<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart		P4	Records have come from plateaus near breakaways and scree, and rugged boulder strewn scree, often in areas with little vegetation.	✓	✓	May potentially occur
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby	Vulnerable	S3	Sandy soils covered with spinifex grassland (mainly <i>Triodia basedowii</i>), with an overstorey of low shrubs dominated by <i>Acacia</i> species.	✗	✗	Unlikely to occur
Notoryctidae	<i>Notoryctes caurinus</i>	Northern Marsupial Mole	Endangered	P4	Well-vegetated sand dunes and sandy soils.	✗	✗	Would not occur
Muridae	<i>Leggadina lakedownensis</i>	Short-tailed Mouse		P4	Cracking clay, native grasslands and surrounding habitats.	✓	✓	Likely to occur

* S = Schedule, P = Priority.

6.3 Conservation Significant Species that are Likely to Occur

6.3.1 Pilbara Olive Python, *Liasis olivaceus barroni* (Schedule 3, Vulnerable)

Distribution: The Pilbara Olive Python has a known distribution that coincides roughly with the Pilbara bioregion (Environment Australia 2000). It is known from 17 localities in the Pilbara and there are four areas where reliable populations occur: Pannawonica, Millstream, Tom Price and the Burrup Peninsula. At some of these sites, the species is considered stable and occurs in sizeable numbers (Department of the Environment 2015b).

Ecology: Preferred habitat for the Pilbara Olive Python includes gorges, escarpments, rocky outcrops and water holes where it may find suitable prey that utilise these environments (Department of the Environment 2015b). It seeks shelter in caves, beneath boulders, in pools of water and occasionally in trees overhanging water (Bush and Maryan 2011). It is often associated with ephemeral or permanent water, but may also be recorded in rocky habitats some distance from these features (Biota 2009c). Males were found to travel large distances (Biota 2009c), suggesting that the species can have a large range (estimated between 88 ha and 449 ha) (Department of the Environment 2015b).

Likelihood of Occurrence: The Pilbara Olive Python has been recorded approximately 3 km southwest of the study area (Biota 2009e) (Figure 6.1). Suitable core habitat (gorges, gullies and free faces) for the species exists within the study area. It is therefore considered likely to occur within the study area.

6.3.2 Lined Soil-Crevice Skink, *Notoscincus butleri* (Priority 4)

Distribution: *Notoscincus butleri* is endemic to Western Australia and restricted to the arid northwest (Storr et al. 1999) of the Pilbara bioregion.

Ecology: This small skink species has been recorded associated with spinifex-dominated areas near creek and river margins (Wilson and Swan 2008). It is diurnal and egg laying (Wilson and Knowles 1988).

Likelihood of Occurrence: *Notoscincus butleri* is likely to occur within the study area, as it has been recorded approximately 8 km northwest of the study area (Biota 2005) (Figure 6.1) and suitable habitat (major and minor creeklines) exists within the study area.

6.3.3 Short-tailed Mouse, *Leggadina lakedownensis* (Priority 4)

Distribution: Prior to 1997, only two specimens of this species had been collected, however the number of records of this species has increased substantially since this time (Cooper et al. 2003). In Western Australia the distribution of this species includes the Pilbara and Kimberley regions (Menkhorst and Knight 2011).

Ecology: The Short-tailed Mouse is known to occur in areas of open tussock and hummock grassland, *Acacia* shrubland and savannah woodland, on sandy soils and cracking clays (Morris et al. 2008). This species has been recorded on cracking clay communities from Cape Preston (60 km west of Dampier) in the west to the northern flanks of the Fortescue Marshes in the east (Halpern Glick Maunsell et al. 2001). These records suggest that the primary mainland habitat comprises areas of cracking clay and adjacent habitats, although this species has also been recorded from hilltops and sandy coastal areas near Onslow.

Likelihood of Occurrence: The Short-tailed Mouse has been recorded approximately 3.5 km southwest of the study area (Biota 2009e) (Figure 6.1). The species is considered likely to occur within the study area, and is predicted to occur in the southwestern portion of the study area, where suitable vegetation and cracking clay soils occur on the Wona colluvial plain landform.

6.4 Conservation Significant Species that May Potentially Occur

6.4.1 Long-tailed Dunnart, *Sminthopsis longicaudata* (Priority 4)

Distribution: The Long-tailed Dunnart inhabits rocky, rugged habitat from the Pilbara and adjacent upper Gascoyne region east to the central Northern Territory and South Australia.

Ecology: This species is nocturnal, and its diet includes a variety of invertebrates. Females in captivity give birth to up to five young between the months of October and December (McKenzie et al. 2008). Records of this species have come from plateaus near breakaways and scree, and rugged boulder strewn scree, often in areas with little vegetation. This species was once considered to be rare and possibly threatened, however research has shown that it is relatively common and widespread but is restricted to a specific habitat (Burbidge 2004).

Likelihood of Occurrence: The Long-tailed Dunnart has the potential to occur within the study area as it has been recorded previously within 40 km, and preferred habitat (rocky areas and free faces) exists within the study area.

6.4.2 Peregrine Falcon, *Falco peregrinus* (Schedule 7)

Distribution: The Peregrine Falcon has an almost cosmopolitan distribution across Australia, but is absent from most deserts and the Nullarbor Plain (Johnstone and Storr 1998).

Ecology: This species inhabits a wide range of habitats including forest, woodlands, wetlands and open country (Pizzey and Knight 2007). Like other birds of prey, the Peregrine Falcon is a relatively long-lived species, with low reproductive rates and low population density. These factors, combined with the fact that they are a top end predator and limited by their prey, make them particularly vulnerable to human impact.

Likelihood of Occurrence: The Peregrine Falcon is widespread through the Pilbara but infrequently recorded, and there are no records from the locality of the study area. Nonetheless, there is suitable habitat (e.g. creeklines and free faces) within the study area for this species, and it would be expected that it may occur at times.

6.5 Conservation Significant Species that are Unlikely to Occur

6.5.1 Northern Quoll, *Dasyurus hallucatus* (Schedule 2, Endangered)

Distribution: The Northern Quoll was historically common across northern Australia, occurring almost continuously from the Pilbara to Brisbane. Its distribution is now restricted to five regional populations across Queensland, the Northern Territory and Western Australia, both on the mainland and on offshore islands (Department of the Environment 2015c). Records from the Pilbara bioregion are scattered across the four subregions (see Section 4.1), with records extending as far east as the Little Sandy Desert and as far south as Karijini National Park.

Habitat Preferences: In the Pilbara, the Northern Quoll is considered to favour rocky gorges, boulder piles, free faces and hills (usually of high relief and often along drainage lines) for denning purposes, where it utilises spaces between rocks or in log or tree hollows (Biota 2009h). Previously completed records frequency analysis (Biota 2009i, 2012) has shown that these critical habitat types are commonly associated with the Capricorn, Macroy, Robe and Newman land systems in the Pilbara bioregion. These land systems include basalt hills, mesas, major drainage channels, low and high plateaus, lower slopes and stony plains (Payne et al. 1988, van Vreeswyk et al. 2004). Adjacent plains and vegetated areas also provide habitats suitable for foraging and dispersal of young (van Dyck and Strahan 2008).

Likelihood of Occurrence: Despite the fact that there is considerable suitable habitat (rocky areas, free faces, gullies and gorges) for the Northern Quoll within the study area, this species is considered unlikely to occur (or to occur at densities lower than readily detectable by current approaches), as there have been no recent records of this species within 40 km of the study area despite substantial survey work.

6.5.2 Bilby, *Macrotis lagotis* (Schedule 3, Vulnerable)

Distribution: Historically found across most of arid and semi-arid Australia, the Bilby is now restricted to the deserts of central Australia including the Tanami, Gibson and Great Sandy Deserts, the east Pilbara and south to Warburton in Western Australia. Western Australian populations are found in the inland Pilbara, southwestern Kimberley, northern Great Sandy Desert and the Gibson Desert (DSEWPac 2012b).

Ecology: The occurrence of this species is strongly influenced by the availability of sandy substrates (where burrowing is easier), areas of higher rainfall and higher temperatures (i.e. higher productivity areas and conditions that are unfavourable for foxes), and in some parts of its range, fire age is also thought to influence species occurrence (DSEWPac 2012b). Habitat near areas that have been recently burnt (one year ago or less) appear to be favoured by the Bilby (DSEWPac 2012b).

Likelihood of Occurrence: There have been no records of this species within the study area or the broader locality, and no particularly suitable habitat is present. This species is considered unlikely to occur in the study area.

6.6 Conservation Significant Species that Would Not Occur

6.6.1 Northern Marsupial Mole, *Notoryctes caurinus* (Priority 4)

Distribution: This species is sparsely distributed across much of arid Australia in sandy desert areas (Menkhorst and Knight 2011).

Ecology: The Northern Marsupial Mole is adapted to living underground, where it burrows through sand. It has no functional eyes, small ear holes and its body is covered in a dense, fine, uniformly golden-brown fur. Individuals live mainly in sand dunes and sandy soils along river flats, where they forage on ants, beetle larvae and arthropods (Menkhorst and Knight 2011).

Likelihood of Occurrence: There are very few records of this species, with most recorded over a decade ago from the eastern Pilbara, Gibson Desert and Kimberley region (NatureMap database). There is no suitable sandy habitat for this species within the study area and it would not be expected to occur.

7.0 Matters of National Environmental Significance

7.1 MNES Fauna Recorded in the Study Area

The Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) was recorded at four sites in the southeastern portion of the study area during the 2015 survey. Activity levels were categorised as 'low', with the calls being made by bats foraging away from a roost site (Appendix 3). This species had also previously been recorded in the central portion of the study area (Biota 2014). The available data indicate that there are no known roosts within foraging distance of the calls recorded, suggesting that an undiscovered roost exists within 15 to 20 km of the calls recorded during the survey.

The Pilbara Olive Python was not recorded during the current survey but has been recorded approximately 3 km south of the study area (Biota 2009e). Due to the presence of suitable habitat, it is considered that this species would be likely to occur within the study area.

7.2 Habitat for MNES Within the Study Area

When assessing the value of habitat in the survey area, it is prudent to determine the core habitat of individual species. Core habitat for species of conservation significance equates to "habitat critical to the survival of a species" (Department of the Environment 2013). Such habitat includes those that are known or are likely to be utilised by conservation significant species for key ecological activities such as denning, roosting, breeding, refugia and important foraging areas. As a result, it is assumed that some proportion of this habitat must be maintained across the species' range to ensure the persistence of the species in the region.

When considering the conservation value of the fauna habitats within the study area, the following factors were used as criteria to assess areas of higher habitat value:

- supports fauna of conservation significance;
- supports unique faunal assemblages; and
- is uncommon in the region.

Based on these criteria, the survey identified the following specific landforms and habitat features within the study area as offering the greatest potential habitat for the MNES Pilbara Leaf-nosed Bat and Pilbara Olive Python, by providing areas suitable for roosting or foraging activities:

- gorges and gullies;
- free faces; and
- waterpools/waterholes.

Figure 7.1 shows the landform features listed above mapped as MNES fauna habitat. The locations of the MNES Pilbara Leaf-nosed Bat recorded within the study area are also shown, as are the locations of water pools or waterholes recorded during the survey (Figure 7.1). Waterholes such as these are likely to represent an important foraging habitat for both Pilbara Leaf-nosed Bats and Pilbara Olive Pythons.

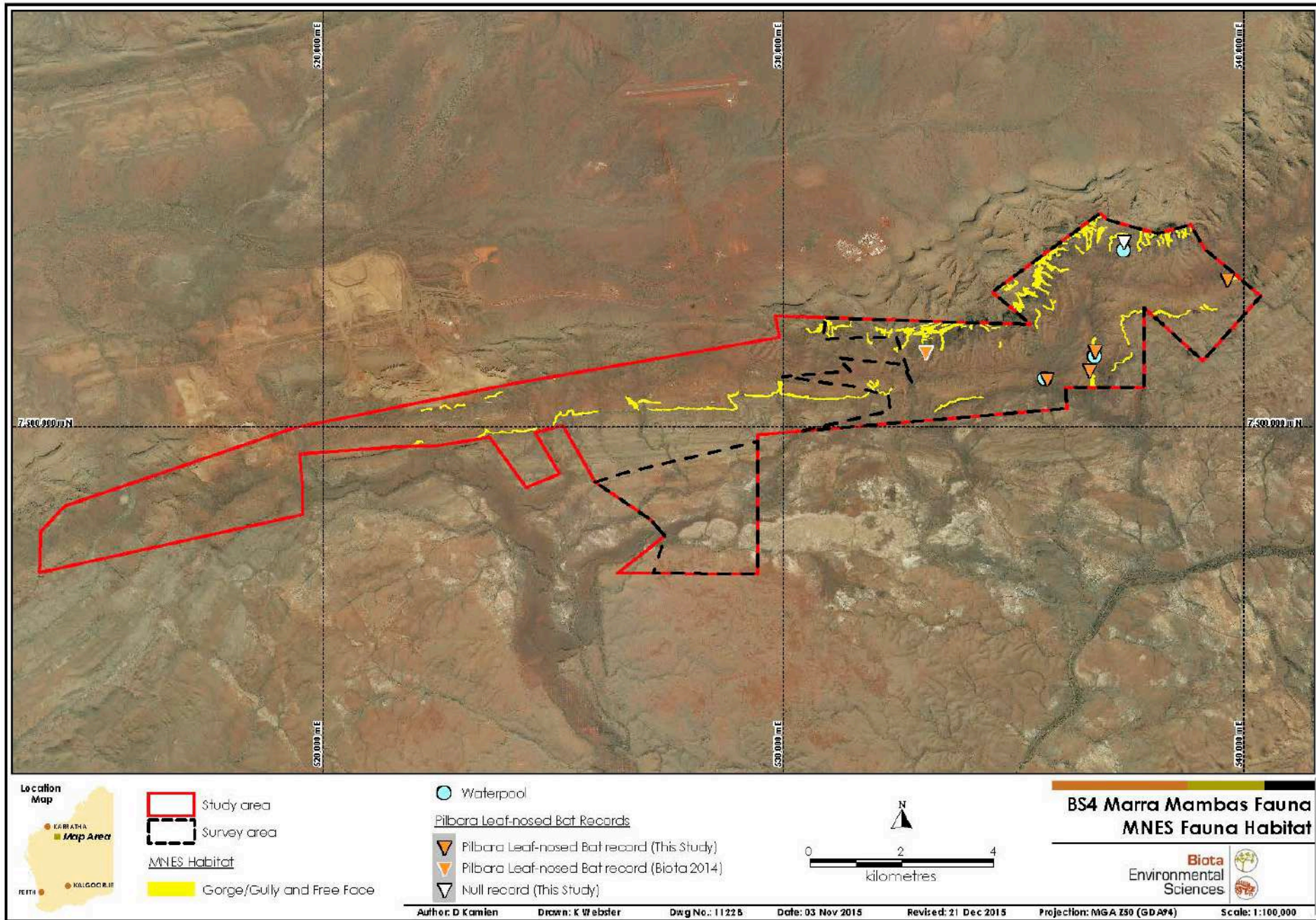


Figure 7.1: MNES fauna records and habitat within the study area.

8.0 Discussion

8.1 Vertebrate Fauna

The survey recorded a total of 100 vertebrate fauna species, comprising 11 ground-dwelling mammal species, 30 reptile species, one amphibian species, nine bat species and 49 bird species. With the inclusion of records from previous surveys conducted within the study area, a total of 133 vertebrate fauna species have been recorded within the study area to date.

Of these, the following five species are formally listed as being of conservation significance:

1. Pilbara Leaf-nosed Bat, *Rhinonictis aurantia* (Schedule 3, Vulnerable)

The Pilbara Leaf-nosed Bat has been recorded at a total of five locations within the study area, with all records being at low activity and regarded as foraging from a roost site. No known roost exists within foraging distance of the records, indicating that there is an undiscovered roost within 15-20 km of the records.

2. Ghost Bat, *Macroderma gigas* (Schedule 3, Vulnerable)

The first Ghost Bat record for the study area was provided by the current survey and this species has only been recorded infrequently in the locality. While suitable habitat is present in the study area and in the broader locality, there are currently no known roosts within foraging distance of the record.

3. Western Pebble-mound Mouse, *Pseudomys chapmani* (Priority 4)

The Western Pebble-mound Mouse has been recorded numerous times in the study area as well as in the broader locality. This species is considered to be locally common.

4. Rainbow Bee-eater, *Merops ornatus* (Schedule 5, Migratory)

Rainbow Bee-eaters have been recorded at two locations in the study area, as well as numerous times in the broader locality. This species is considered to be locally common.

5. Fork-tailed Swift, *Apus pacificus* (Schedule 5; Migratory)

The Fork-tailed Swift has been recorded once within the study area and whilst it is not considered to be locally common, this species would not be restricted to the study area.

Of the conservation significant species recorded, the Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*) is listed as Vulnerable under the Commonwealth EPBC Act and constitutes a MNES.

Additionally, the MNES Pilbara Olive Python (*Liasis olivaceus barroni*) is considered likely to occur in the study area, based on the presence of suitable habitat and previous records in the locality.

8.2 Fauna Habitats

Four fauna landscapes were identified within the study area:

1. Mountainous rugged terrain comprising ridges, plateaus and steep hills with free faces;
2. Dissected gentle slopes and raised plains;
3. Undulating plains with outcropping; and
4. Cracking clay plains.

The survey identified the following specific landform features within the study area (mainly within landscape types 1 and 2) as offering the greatest potential habitat for the MNES Pilbara Leaf-nosed Bat and Pilbara Olive Python, by providing areas suitable for roosting or foraging activities:

- gorges and gullies;
- free faces; and
- waterpools/waterholes.
-

These features occur predominantly in the eastern portion of the study area and are regarded as common within the Pilbara bioregion.

8.3 SRE Invertebrate Fauna

Four mygalomorph spider taxa have been recorded within the study area to date: *Aname* sp. N126 (Biota 2013a), and three morphospecies from the current survey (Barychelidae sp., Nemesiidae sp. 'sock' and *Aname* sp. 'hooded'). An additional taxon, *Aname* sp. N19, has also been recorded outside of the study area (Biota 2013a). It is possible that the Nemesiid specimens recorded from the current survey represent the same species recorded by Biota (2013a), and these may therefore be distributed outside of the study area, however molecular sequencing of the specimens from the study area would be required to confirm this. Similarly, the Barychelidae sp. taxon may also have been recorded previously outside of the study area.

Short-range endemism is known to be common in both families of mygalomorph spider recorded (the Barychelidae and Nemesiidae). For the purpose of this report, the mygalomorph spider taxa recorded from the current survey are currently considered to represent potential SREs based on the criteria outlined in Table 3.8.

Similarly, the land snail specimens recorded by the current survey are also regarded as potential SREs. The *Rhagada* specimens recorded may correspond to the lineages previously recorded in the study area (*Rhagada* sp. 'Panna' and 'Tom Price/Beasley' (Biota 2013a)) and therefore have distributions extending outside of the survey area, however this remains undetermined in the absence of any molecular work.

9.0 Glossary

ALA	Atlas of Living Australia.
Biota	Biota Environmental Sciences.
BS4	Brockman Syncline 4.
Conservation significant	Fauna species listed as being of conservation significance under State or Commonwealth legislation; also habitat likely to support such species.
EIA	Environmental Impact Assessment.
Elliott trap	A collapsible aluminium box trap.
EPA	Environmental Protection Authority of Western Australia.
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
GPS	Global Positioning System.
IBRA	Interim Biogeographic Regionalisation for Australia.
MNES	Matters of National Environmental Significance listed under the Commonwealth EPBC Act.
NVCP	Native Vegetation Clearing Permit.
Opportunistic record	A species recorded by non-systematic sampling methods.
SM2	A model of Song Meter by Wildlife Acoustics.
sp. (plural: spp.)	Abbreviation of "species".
SRE	Short-range endemic fauna.
Study area	The 5,806 ha area to encompass the BS4 Marra Mambas mine and infrastructure.
Survey area	The 2,436 ha subsection of the study area, in which the 2015 fauna survey was conducted.
WAM	Western Australian Museum.

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Appendix 1

Database Search Results



NatureMap Species Report

Created By penny brooshooft on 21/07/2015

Current Names Only Yes

Core Datasets Only Yes

Species Group Amphibians

Method 'By Circle'

Centre 117°16' 06" E, 22°36' 15" S

Buffer 40km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	25375	<i>Cyclorana maini</i> (Sheep Frog)			
2.	25392	<i>Litoria rubella</i> (Little Red Tree Frog)			
3.	25445	<i>Uperoleia russelli</i> (Northwest Toadlet)			
4.	41428	<i>Uperoleia saxatilis</i> (Pilbara Toadlet)			

Conservation Codes

T - Rare or likely to become extinct
 X - Presumed extinct
 IA - Protected under international agreement
 S - Other specially protected fauna
 1 - Priority 1
 2 - Priority 2
 3 - Priority 3
 4 - Priority 4
 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Species Report

Created By penny brooshooft on 21/07/2015

Current Names Only Yes
Core Datasets Only Yes
Species Group Reptiles
Method 'By Circle'
Centre 117°16' 06" E, 22°36' 15" S
Buffer 40km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	25332 <i>Acanthophis wellsi</i> (Pilbara Death Adder)			
2.	30833 <i>Amphibolurus longirostris</i> (Long-nosed Dragon)			
3.	25318 <i>Antaresia perthensis</i> (Pygmy Python)			
4.	25448 <i>Antaresia stimsoni</i> (Stimson's Python)			
5.	25319 <i>Antaresia stimsoni</i> subsp. <i>orientalis</i> (Stimson's Python)			
6.	25241 <i>Antaresia stimsoni</i> subsp. <i>stimsoni</i> (Stimson's Python)			
7.	25331 <i>Brachyuropis approximans</i> (North-western Shovel-nosed Snake)			
8.	25015 <i>Carlia munda</i> (Shaded-litter Rainbow Skink)			
9.	25017 <i>Carlia triacantha</i> (Desert Rainbow Skink)			
10.	30893 <i>Cryptoblepharus buehneri</i>			
11.	25020 <i>Cryptoblepharus plagiocephalus</i>			
12.	30892 <i>Cryptoblepharus ustulatus</i>			
13.	25458 <i>Ctenophorus caudicinctus</i> (Ring-tailed Dragon)			
14.	24865 <i>Ctenophorus caudicinctus</i> subsp. <i>caudicinctus</i> (Ring-tailed Dragon)			
15.	25459 <i>Ctenophorus isolepis</i> (Crested Dragon, Military Dragon)			
16.	24874 <i>Ctenophorus isolepis</i> subsp. <i>citrinus</i> (Crested Dragon, Military Dragon)			
17.	24876 <i>Ctenophorus isolepis</i> subsp. <i>isolepis</i> (Crested Dragon, Military Dragon)			
18.	24882 <i>Ctenophorus nuchalis</i> (Central Netted Dragon)			
19.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
20.	25036 <i>Ctenotus duricola</i>			
21.	25462 <i>Ctenotus grandis</i>			
22.	25041 <i>Ctenotus grandis</i> subsp. <i>grandis</i>			
23.	25043 <i>Ctenotus grandis</i> subsp. <i>titan</i>			
24.	25044 <i>Ctenotus hanloni</i>			
25.	25045 <i>Ctenotus helenae</i>			
26.	25052 <i>Ctenotus leonhardii</i>			
27.	25463 <i>Ctenotus pantherinus</i> (Leopard Ctenotus)			
28.	25060 <i>Ctenotus pantherinus</i> subsp. <i>acripes</i> (Leopard Ctenotus)			
29.	25064 <i>Ctenotus pantherinus</i> subsp. <i>ocellifer</i> (Leopard Ctenotus)			
30.	25065 <i>Ctenotus pantherinus</i> subsp. <i>pantherinus</i> (Leopard Ctenotus)			
31.	25070 <i>Ctenotus robustus</i>			
32.	25072 <i>Ctenotus rubicundus</i>			
33.	25071 <i>Ctenotus rutilans</i>			
34.	25073 <i>Ctenotus saxatilis</i> (Rock Ctenotus)			
35.	25074 <i>Ctenotus schomburgkii</i>			
36.	25465 <i>Ctenotus uber</i> (Spotted Ctenotus)			
37.	25080 <i>Ctenotus uber</i> subsp. <i>uber</i> (Spotted Ctenotus)			
38.	25466 <i>Cyclodomorphus melanops</i> (Slender Blue-tongue)			
39.	25089 <i>Cyclodomorphus melanops</i> subsp. <i>elongatus</i> (Slender Blue-tongue)			
40.	25090 <i>Cyclodomorphus melanops</i> subsp. <i>melanops</i> (Slender Blue-tongue)			
41.	24998 <i>Delma elegans</i>			
42.	25001 <i>Delma nasuta</i>			
43.	25002 <i>Delma pax</i>			
44.	25004 <i>Delma tinca</i>			
45.	25468 <i>Demansia psammophis</i> (Yellow-faced Whipsnake)			
46.	25295 <i>Demansia psammophis</i> subsp. <i>cupreiceps</i> (Yellow-faced Whipsnake)			
47.	25297 <i>Demansia rufescens</i> (Rufous Whipsnake)			
48.	24926 <i>Diplodactylus conspicillatus</i> (Fat-tailed Gecko)			
49.	24944 <i>Diplodactylus savagei</i> (Southern Pilbara Beak-faced Gecko)			
50.	24899 <i>Diporiphora valens</i> (Southern Pilbara Tree Dragon)			
51.	25092 <i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
52.	25094 <i>Egernia formosa</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
53.	25109 <i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)			
54.	25301 <i>Furina ornata</i> (Moon Snake)			
55.	24956 <i>Gehyra pilbara</i>			
56.	24958 <i>Gehyra punctata</i>			
57.	24959 <i>Gehyra variegata</i>			
58.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
59.	24962 <i>Heteronotia spelea</i> (Desert Cave Gecko)			
60.	25135 <i>Lerista flammicauda</i>			
61.	25482 <i>Lerista macropisthopus</i>			
62.	25155 <i>Lerista muelleri</i>			
63.	30925 <i>Lerista verhmens</i>			
64.	25005 <i>Lialis burtonis</i>			
65.	25238 <i>Liasis olivaceus</i> subsp. <i>barroni</i> (Pilbara Olive Python)		T	
66.	30933 <i>Lucasium stenodactylum</i>			
67.	30934 <i>Lucasium wombeyi</i>			
68.	25184 <i>Menetia greyii</i>			
69.	25491 <i>Menetia surda</i>			
70.	25187 <i>Menetia surda</i> subsp. <i>surda</i>			
71.	25193 <i>Morethia ruficauda</i> subsp. <i>exquisita</i>			
72.	25194 <i>Morethia ruficauda</i> subsp. <i>ruficauda</i>			
73.	25498 <i>Nephurus wheeleri</i>			
74.	24972 <i>Nephurus wheeleri</i> subsp. <i>cinctus</i>			
75.	25196 <i>Notoscincus butleri</i> (Lined Soil-crevice Skink)		P4	
76.	25197 <i>Notoscincus ornatus</i> subsp. <i>ornatus</i>			
77.	24976 <i>Oedura marmorata</i> (Marbled Velvet Gecko)			
78.	25254 <i>Parasuta monachus</i>			
79.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
80.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
81.	25199 <i>Proablepharus reginae</i>			
82.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
83.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
84.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
85.	25264 <i>Pseudonaja nuchalis</i> (Gwardar, Northern Brown Snake)			
86.	25009 <i>Pygopus nigriceps</i>			
87.	24982 <i>Rhynchoedura ornata</i> (Western Beaked Gecko)			
88.	24927 <i>Strophurus elderi</i>			
89.	24949 <i>Strophurus wellingtonae</i>			
90.	25269 <i>Suta fasciata</i> (Rosen's Snake)			
91.	25307 <i>Suta punctata</i> (Spotted Snake)			
92.	25202 <i>Tiliqua multifasciata</i> (Central Blue-tongue)			
93.	30814 <i>Tympanocryptis cephalus</i> (Pebble Dragon)			
94.	25209 <i>Varanus acanthurus</i> (Spiny-tailed Monitor)			
95.	25210 <i>Varanus brevicauda</i> (Short-tailed Pygmy Monitor)			
96.	30825 <i>Varanus bushi</i> (Pilbara Mulga Monitor)			
97.	25211 <i>Varanus caudolineatus</i>			
98.	25212 <i>Varanus eremius</i> (Pygmy Desert Monitor)			
99.	25216 <i>Varanus giganteus</i> (Perentie)			
100.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
101.	25524 <i>Varanus panoptes</i> (Yellow-spotted Monitor)			
102.	25222 <i>Varanus panoptes</i> subsp. <i>panoptes</i>			
103.	25224 <i>Varanus pilbarensis</i> (Pilbara Rock Monitor)			
104.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			
105.	25227 <i>Varanus tristis</i> subsp. <i>tristis</i> (Racehorse Monitor)			
106.	25311 <i>Vermicella snelli</i>			

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NatureMap Species Report

Created By penny brooshoof on 21/07/2015

Current Names Only Yes
Core Datasets Only Yes
Species Group Birds
Method 'By Circle'
Centre 117°16' 06" E, 22°36' 15" S
Buffer 40km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
3.	24264 <i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
4.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
5.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
6.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
7.	24283 <i>Accipiter fasciatus</i> subsp. <i>didimus</i> (Brown Goshawk)			
8.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
9.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
10.	25647 <i>Amytornis striatus</i> (Striated Grasswren)			
11.	24539 <i>Amytornis striatus</i> subsp. <i>striatus</i> (Striated Grasswren (inland))		P4	
12.	24540 <i>Amytornis striatus</i> subsp. <i>whitei</i> (Striated Grasswren)			
13.	24312 <i>Anas gracilis</i> (Grey Teal)			
14.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
15.	24332 <i>Anhinga melanogaster</i> subsp. <i>novaehollandiae</i> (Darter)			
16.	25670 <i>Anthus australis</i> (Australian Pipit)			
17.	24268 <i>Aphelocephala nigricincta</i> (Banded Whiteface)			
18.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
19.	24337 <i>Ardea garzetta</i> subsp. <i>nigrripes</i> (Little Egret)			
20.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
21.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
22.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
23.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
24.	24352 <i>Artamus cinereus</i> subsp. <i>melanops</i> (Black-faced Woodswallow)			
25.	24355 <i>Artamus minor</i> (Little Woodswallow)			
26.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
27.	24359 <i>Burhinus grallarius</i> (Bush Stone-curlew)			
28.	25715 <i>Cacatua roseicapilla</i> (Galah)			
29.	24726 <i>Cacatua roseicapilla</i> subsp. <i>roseicapilla</i> (Galah)			
30.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
31.	24727 <i>Cacatua sanguinea</i> subsp. <i>westralensis</i> (Little Corella)			
32.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
33.	24564 <i>Certhionyx variegatus</i> (Pied Honeyeater)			
34.	24373 <i>Charadrius melanops</i> (Black-fronted Dotterel)			
35.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
36.	24833 <i>Cincloramphus cruralis</i> (Brown Songlark)			
37.	24834 <i>Cincloramphus mathewsi</i> (Rufous Songlark)			
38.	42311 <i>Cincolosoma marginatum</i> (Western Quail-thrush)			
39.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
40.	25582 <i>Climacteris melanura</i> (Black-tailed Treecreeper)			
41.	24395 <i>Climacteris melanura</i> subsp. <i>wellsi</i> (Black-tailed Treecreeper)			
42.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
43.	24611 <i>Colluricincla harmonica</i> subsp. <i>brunnea</i> (Grey Shrike-thrush)			
44.	24613 <i>Colluricincla harmonica</i> subsp. <i>rufiventris</i> (Grey Shrike-thrush)			
45.	24361 <i>Coracina maxima</i> (Ground Cuckoo-shrike)			
46.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
47.	24362 <i>Coracina novaehollandiae</i> subsp. <i>novaehollandiae</i> (Black-faced Cuckoo-shrike)			
48.	24363 <i>Coracina novaehollandiae</i> subsp. <i>subpallida</i> (Black-faced Cuckoo-shrike)			
49.	24416 <i>Corvus bennetti</i> (Little Crow)			
50.	25593 <i>Corvus orru</i> (Torresian Crow)			
51.	24418 <i>Corvus orru</i> subsp. <i>ceciliae</i> (Western Crow)			
52.	25701 <i>Coturnix ypsilophora</i> (Brown Quail)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
53.	24672 <i>Coturnix ypsilophora</i> subsp. <i>cervina</i> (Brown Quail)			
54.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
55.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
56.	24422 <i>Cracticus tibicen</i> subsp. <i>dorsalis</i> (White-backed Magpie)			
57.	24423 <i>Cracticus tibicen</i> subsp. <i>tibicen</i> (Black-backed Magpie)			
58.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
59.	24424 <i>Cracticus torquatus</i> subsp. <i>torquatus</i> (Grey Butcherbird)			
60.	24322 <i>Cygnus atratus</i> (Black Swan)			
61.	25547 <i>Dacelo leachii</i> (Blue-winged Kookaburra)			
62.	24304 <i>Dacelo leachii</i> subsp. <i>leachii</i> (Blue-winged Kookaburra)			
63.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
64.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
65.	24441 <i>Dicaeum hirundinaceum</i> subsp. <i>hirundinaceum</i> (Mistletoebird)			
66.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
67.	25540 <i>Elanus caeruleus</i> (Black-shouldered Kite)			
68.	24631 <i>Emblema pictum</i> (Painted Finch)			
69.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
70.	24837 <i>Eremiornis carteri</i> (Spinifex-bird)			
71.	24379 <i>Erythronyctes alba</i> (Red-kneed Dotterel)			
72.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
73.	25621 <i>Falco berigora</i> (Brown Falcon)			
74.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
75.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
76.	24472 <i>Falco cenchroides</i> subsp. <i>cenchroides</i> (Australian Kestrel)			
77.	25623 <i>Falco longipennis</i> (Australian Hobby)			
78.	24474 <i>Falco longipennis</i> subsp. <i>longipennis</i> (Australian Hobby)			
79.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
80.	25585 <i>Geopelia striata</i> (Zebra Dove)			
81.	24403 <i>Geopelia striata</i> subsp. <i>placida</i> (Peaceful Dove)			
82.	24404 <i>Geophaps plumifera</i> (Spinifex Pigeon)			
83.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
84.	24271 <i>Gerygone fusca</i> subsp. <i>fusca</i> (Western Gerygone)			
85.	<i>Gerygone fusca</i> subsp. <i>mungi</i>			
86.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
87.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
88.	24296 <i>Hamirostra isura</i> (Square-tailed Kite)			
89.	24297 <i>Hamirostra melanosternon</i> (Black-breasted Buzzard)			
90.	24489 <i>Hirundo ariel</i> (Fairy Martin)			
91.	25629 <i>Hirundo nigricans</i> (Tree Martin)			
92.	24492 <i>Hirundo nigricans</i> subsp. <i>nigricans</i> (Tree Martin)			
93.	24572 <i>Lacustroica whitei</i> (Grey Honeyeater)			
94.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
95.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
96.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
97.	25651 <i>Malurus lamberti</i> (Variegated Fairy-wren)			
98.	24544 <i>Malurus lamberti</i> subsp. <i>assimilis</i> (Variegated Fairy-wren)			
99.	24545 <i>Malurus lamberti</i> subsp. <i>bernieri</i> (Bernier Is. Variegated Fairy-wren)		T	
100.	24546 <i>Malurus lamberti</i> subsp. <i>rogersi</i> (Variegated Fairy-wren)			
101.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
102.	24548 <i>Malurus leucopterus</i> subsp. <i>leucopterus</i> (Dirk Hartog Is. White-winged Fairy-wren)			T
103.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
104.	25665 <i>Meliphreptus gularis</i> (Black-chinned Honeyeater)			
105.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
106.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
107.	25693 <i>Microeca fascians</i> (Jacky Winter)			
108.	24302 <i>Mirafra javanica</i> subsp. <i>horsfieldii</i> (Horsfield's Bushlark, Singing Bushlark)			
109.	24639 <i>Neochmia ruficauda</i> subsp. <i>clarescens</i> (Star Finch)			
110.	25747 <i>Ninox connivens</i> (Barking Owl)			
111.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
112.	24820 <i>Ninox novaeseelandiae</i> subsp. <i>boobook</i> (Boobook Owl)			
113.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
114.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
115.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
116.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
117.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
118.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
119.	24627 <i>Pardalotus rubricatus</i> (Red-browed Pardalote)			
120.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
121.	24628 <i>Pardalotus striatus</i> subsp. <i>murchisoni</i> (Striated Pardalote)			
122.	24629 <i>Pardalotus striatus</i> subsp. <i>uropygialis</i> (Striated Pardalote)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
123.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
124.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
125.	24658 <i>Petroica cucullata</i> (Hooded Robin)			
126.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
127.	24666 <i>Phalacrocorax melanoleucos</i> subsp. <i>melanoleucos</i> (Little Pied Cormorant)			
128.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
129.	24668 <i>Phalacrocorax varius</i> subsp. <i>hypoleucos</i> (Pied Cormorant)			
130.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
131.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
132.	24751 <i>Platycercus zonarius</i> subsp. <i>zonarius</i> (Port Lincoln Parrot)			
133.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
134.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
135.	25706 <i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
136.	24684 <i>Pomatostomus temporalis</i> subsp. <i>rubeculus</i> (Grey-crowned Babbler)			
137.	25724 <i>Ptilonorhynchus maculatus</i> (Spotted Bowerbird)			
138.	24757 <i>Ptilonorhynchus maculatus</i> subsp. <i>guttatus</i> (Western Bowerbird)			
139.	42341 <i>Ptilotula penicillatus</i> (White-plumed Honeyeater)			
140.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
141.	24451 <i>Rhipidura fuliginosa</i> subsp. <i>alisteri</i> (Grey Fantail)			
142.	24452 <i>Rhipidura fuliginosa</i> subsp. <i>preissi</i> (Grey Fantail)			
143.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
144.	24454 <i>Rhipidura leucophrys</i> subsp. <i>leucophrys</i> (Willie Wagtail)			
145.	30948 <i>Smicrornis brevirostris</i> (Weebill)			
146.	25656 <i>Stipiturus ruficeps</i> (Rufous-crowned Emu-wren)			
147.	24556 <i>Stipiturus ruficeps</i> subsp. <i>ruficeps</i> (Rufous-crowned Emu-wren)			
148.	42310 <i>Sugomel niger</i> (Black Honeyeater)			
149.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
150.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
151.	30871 <i>Taeniopygia guttata</i> subsp. <i>castanotis</i> (Zebra Finch)			
152.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
153.	42351 <i>Todiramphus pyrrhopygius</i> (Red-backed Kingfisher)			
154.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
155.	24851 <i>Turnix velox</i> (Little Button-quail)			

Conservation Codes

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NatureMap Species Report

Created By penny brooshooft on 21/07/2015

Current Names Only Yes
Core Datasets Only Yes
Species Group Mammals
Method 'By Circle'
Centre 117°16' 06" E, 22°36' 15" S
Buffer 40km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	24251 <i>Bos taurus</i> (European Cattle)	Y		
2.	25454 <i>Canis lupus</i> (Dog, Dingo)	Y		
3.	24039 <i>Canis lupus subsp. dingo</i> (Dingo)	Y		
4.	24181 <i>Chaerephon jobensis</i> (Northern Freetail-bat)			
5.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
6.	24091 <i>Dasykaluta rosamondae</i> (Little Red Kaluta)			
7.	24257 <i>Equus asinus</i> (Donkey)	Y		
8.	24041 <i>Felis catus</i> (Cat)	Y		
9.	24217 <i>Leggadina lakedownensis</i> (Short-tailed Mouse, Karekanga)		P4	
10.	24180 <i>Macroderma gigas</i> (Ghost Bat)		P4	
11.	25489 <i>Macropus robustus</i> (Euro)			
12.	24135 <i>Macropus robustus subsp. erubescens</i> (Euro, Biggada)			
13.	24136 <i>Macropus rufus</i> (Red Kangaroo, Marlu)			
14.	24182 <i>Mormopterus beccarii</i> (Beccari's Freetail-bat)			
15.	24223 <i>Mus musculus</i> (House Mouse)	Y		
16.	24095 <i>Ningau timealeyi</i> (Pilbara Ningau)			
17.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
18.	24101 <i>Planigale ingrami</i> (Long-tailed Planigale)			
19.	24102 <i>Planigale maculata</i> (Common Planigale)			
20.	24105 <i>Pseudantechinus roryi</i> (Rory's Pseudantechinus)			
21.	24106 <i>Pseudantechinus woolleyae</i> (Woolley's Pseudantechinus)			
22.	24233 <i>Pseudomys chapmani</i> (Western Pebble-mound Mouse, Ngadji)		P4	
23.	24235 <i>Pseudomys desertor</i> (Desert Mouse)			
24.	24237 <i>Pseudomys hermannsburgensis</i> (Sandy Inland Mouse)			
25.	24174 <i>Saccolaimus flaviventris</i> (Yellow-bellied Sheathtail-bat)			
26.	24199 <i>Scotorepens balstoni</i> (Inland Broad-nosed Bat)			
27.	24200 <i>Scotorepens greyii</i> (Little Broad-nosed Bat)			
28.	24115 <i>Sminthopsis longicaudata</i> (Long-tailed Dunnart)		P4	
29.	24116 <i>Sminthopsis macroura</i> (Stripe-faced Dunnart)			
30.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
31.	24175 <i>Taphozous georgianus</i> (Common Sheathtail-bat)			
32.	24176 <i>Taphozous hillii</i> (Hill's Sheathtail-bat)			
33.	24205 <i>Vespadelus finlaysoni</i> (Finlayson's Cave Bat)			
34.	24248 <i>Zyomys argurus</i> (Common Rock-rat)			

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NatureMap Species Report

Created By penny brooshooft on 21/07/2015

Current Names Only Yes
Core Datasets Only Yes
Species Group Invertebrates
Method 'By Circle'
Centre 117°16' 06" E, 22°36' 15" S
Buffer 40km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	<i>Abnitocrella halsei</i>			
2.	<i>Acarina sp.</i>			
3.	<i>Ameiridae sp.</i>			
4.	<i>Amphipoda sp.</i>			
5.	<i>Aname marae</i>			
6.	<i>Aname mellosa</i>			
7.	<i>Areacandona 'hammuldii' (PSS)</i>			Y
8.	<i>Areacandona sp. 8 (PSS)</i>			Y
9.	<i>Argiope protensa</i>			
10.	<i>Arrenurus sp. S3 (PSS)</i>			
11.	<i>Arthrorhabdus paucispinus</i>			
12.	<i>Austrostrophus stictopygus</i>			
13.	<i>Bigenditia zuytdorp</i>			
14.	<i>Calanoida sp.</i>			
15.	<i>Cavasteron tenuicalcar</i>			
16.	<i>Cavisternum clavatum</i>			
17.	<i>Cormocephalus strigosus</i>			
18.	<i>Cryptoerithus halli</i>			
19.	<i>Ethmostigmus curtipes</i>			
20.	<i>Gomphodella sp.</i>			
21.	<i>Gomphodella sp. 1 (PSS)</i>			Y
22.	<i>Gomphodella sp. 3 (PSS)</i>			
23.	<i>Haptolana sp. nov. 1 (PSS)</i>			
24.	<i>Harpacticoida sp. 1 (PSS)</i>			Y
25.	<i>Hoggicosa bicolor</i>			
26.	<i>Humphreyscandona adorea</i>			
27.	<i>Humphreyscandona cf. imperfecta (PSS)</i>			
28.	<i>Lampona quinqueplagiata</i>			
29.	<i>Leptasteron platyconductor</i>			
30.	<i>Melitidae sp. 1 (PSS)</i>			
31.	<i>Nedsia nr sp. 176 (PSS)</i>			
32.	<i>Nedsia sp. 2 (PSS)</i>			
33.	<i>Nedsia sp. 4 (PSS)</i>			
34.	<i>Nedsia sp. 5 (PSS)</i>			Y
35.	<i>No invertebrates</i>			
36.	<i>Notobathynella sp.</i>			
37.	<i>Orbuscyclops westaustraliensis</i>			
38.	<i>Oribatida group 1 (PSS)</i>			
39.	<i>Origocandona cf. 'inanitas' (PSS)</i>			
40.	<i>Orphnaeus brevilabiatus</i>			
41.	<i>Ostracoda (unident.)</i>			
42.	<i>Paramelittidae sp.</i>			
43.	<i>Parastenocaris sp. 3 (PSS)</i>			
44.	<i>Pediana tenuis</i>			
45.	<i>Phreodrilid with dissimilar ventral chaetae</i>			
46.	<i>Phreodrilus peniculus</i>			
47.	<i>Pilbarascutigera incola</i>			
48.	<i>Pilbarus millsii</i>			
49.	<i>Pygolabis eberhardi</i>			
50.	<i>Pygolabis sp.</i>			
51.	<i>Schizopera sp. 3 (PSS)</i>			Y
52.	<i>Schizopera sp. 4 (PSS)</i>			Y

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
53.	<i>Scolopendra laeta</i>			
54.	<i>Scolopendra morsitans</i>			
55.	<i>Speocirolana? sp. nov. 1 (PSS)</i>			
56.	<i>Supunna funerea</i>			
57.	<i>Synothele karara</i>			
58.	<i>Thereuopoda lesueurii</i>			
59.	<i>Trachyspina capensis</i>			
60.	<i>Trichocycclus nigropunctatus</i>			
61.	<i>Tyrannochthonius aridus</i>			
62.	<i>Urodacus megamastigus</i>			
63.	<i>Wandella waldockae</i>			
64.	<i>Wesmaldra nixaut</i>			
65.	<i>Wyndundra barrow</i>			
66.	<i>Wyndundra kennedy</i>			
67.	<i>Wyndundra solo</i>			

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 21/07/15 16:31:47

[Summary](#)

[Details](#)

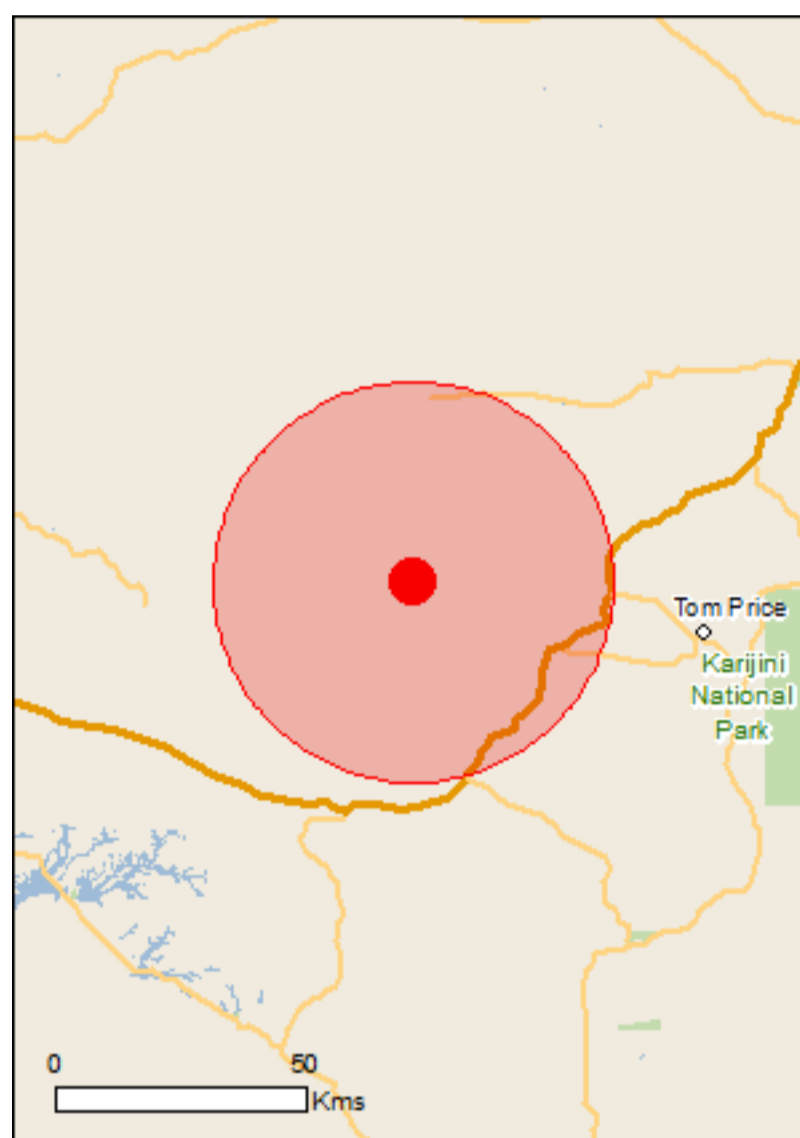
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

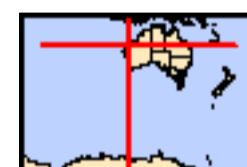
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 40.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	7
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	7
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	9
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
------	--------	------------------

Birds

Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
--	------------	--

Mammals

Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
---	------------	--

Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
---	------------	--

Notoryctes caurinus Kakarratul, Northern Marsupial Mole [295]	Endangered	Species or species habitat may occur within area
--	------------	--

Rhinonictis aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
---	------------	---

Plants

Lepidium catapycnon Hamersley Lepidium, Hamersley Catapycnon [9397]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

Reptiles

Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

Listed Migratory Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Migratory Marine Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
---	--	--

Migratory Terrestrial Species

Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
---	--	--

Migratory Wetlands Species

Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur
--	--	--

Name	Threatened	Type of Presence within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species

[[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Mammals		
<i>Canis lupus familiaris</i> Domestic Dog [82654]		Species or species habitat likely to occur within area
<i>Equus asinus</i> Donkey, Ass [4]		Species or species habitat likely to occur within area
<i>Equus caballus</i> Horse [5]		Species or species habitat likely to occur within area
<i>Felis catus</i> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<i>Mus musculus</i> House Mouse [120]		Species or species habitat likely to occur within area
<i>Oryctolagus cuniculus</i> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<i>Vulpes vulpes</i> Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
<i>Cenchrus ciliaris</i> Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-22.6042 117.2685

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

ALA Search: Reptiles

Family	Species Name	Common Name
Agamidae	<i>Amphibolurus longirostris</i>	
Agamidae	<i>Ctenophorus caudicinctus caudicinctus</i>	
Agamidae	<i>Ctenophorus isolepis isolepis</i>	Central Military Dragon
Agamidae	<i>Ctenophorus reticulatus</i>	Western Netted Dragon
Agamidae	<i>Diporiphora amphiboluroides</i>	Mulga Dragon
Agamidae	<i>Diporiphora valens</i>	Southern Pilbara Tree Dragon
Agamidae	<i>Pogona minor</i>	
Agamidae	<i>Tympanocryptis cephalus</i>	Pebble Dragon
Carphodactylidae	<i>Nephurus wheeleri</i>	
Diplodactylidae	<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko
Diplodactylidae	<i>Diplodactylus savagei</i>	Southern Pilbara Beak-faced Gecko
Diplodactylidae	<i>Lucasium stenodactylum</i>	
Diplodactylidae	<i>Lucasium wombeyi</i>	
Diplodactylidae	<i>Oedura marmorata</i>	Marbled Velvet Gecko
Diplodactylidae	<i>Rhynchoedura ornata</i>	Western Beaked Gecko
Diplodactylidae	<i>Strophurus elderi</i>	
Diplodactylidae	<i>Strophurus wellingtonae</i>	
Egerniidae	<i>Cyclodomorphus melanops</i>	Slender Blue-tongue
Egerniidae	<i>Egernia formosa</i>	
Egerniidae	<i>Tiliqua multifasciata</i>	Central Blue-tongue
Elapidae	<i>Acanthophis wellsi</i>	Pilbara Death Adder
Elapidae	<i>Brachyuropsis approximans</i>	
Elapidae	<i>Pseudechis australis</i>	Mulga Snake
Elapidae	<i>Pseudonaja modesta</i>	Ringed Brown Snake
Elapidae	<i>Vermicella snelli</i>	
Eugongylidae	<i>Carlia munda</i>	
Eugongylidae	<i>Cryptoblepharus buchananii</i>	
Eugongylidae	<i>Cryptoblepharus ustulatus</i>	
Eugongylidae	<i>Menetia greyii</i>	
Eugongylidae	<i>Menetia surda</i>	
Eugongylidae	<i>Morethia ruficauda exquisita</i>	
Gekkonidae	<i>Gehyra pilbara</i>	
Gekkonidae	<i>Gehyra punctata</i>	
Gekkonidae	<i>Gehyra variegata</i>	
Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's Gecko
Gekkonidae	<i>Heteronotia spelea</i>	Pilbara Cave Gecko
Pygopodidae	<i>Delma elegans</i>	
Pygopodidae	<i>Delma nasuta</i>	
Pygopodidae	<i>Delma pax</i>	
Pygopodidae	<i>Delma tincta</i>	
Pygopodidae	<i>Lialis burtonis</i>	
Pygopodidae	<i>Pygopus nigriceps</i>	
Sphenomorphidae	<i>Ctenotus duricola</i>	
Sphenomorphidae	<i>Ctenotus grandis titan</i>	
Sphenomorphidae	<i>Ctenotus helenae</i>	
Sphenomorphidae	<i>Ctenotus pantherinus</i>	Leopard Ctenotus
Sphenomorphidae	<i>Ctenotus robustus</i>	
Sphenomorphidae	<i>Ctenotus rubicundus</i>	
Sphenomorphidae	<i>Ctenotus rutilans</i>	
Sphenomorphidae	<i>Ctenotus saxatilis</i>	Rock Ctenotus
Sphenomorphidae	<i>Ctenotus schomburgkii</i>	
Sphenomorphidae	<i>Ctenotus uber</i>	
Sphenomorphidae	<i>Eremiascincus richardsonii</i>	Broad-banded Sand Swimmer
Sphenomorphidae	<i>Lerista flammicauda</i>	
Sphenomorphidae	<i>Lerista muelleri</i>	
Sphenomorphidae	<i>Lerista verhmens</i>	
Sphenomorphidae	<i>Notoscincus butleri</i>	
Sphenomorphidae	<i>Notoscincus ornatus</i>	
Typhlopidae	<i>Anilius ammodytes</i>	
Typhlopidae	<i>Anilius grypus</i>	
Typhlopidae	<i>Anilius hamatus</i>	
Typhlopidae	<i>Anilius pilbarensis</i>	
Varanidae	<i>Varanus acanthurus</i>	Spiny-tailed Goanna
Varanidae	<i>Varanus brevicauda</i>	Short-tailed Pygmy Goanna
Varanidae	<i>Varanus bushi</i>	Pilbara Mulga Goanna
Varanidae	<i>Varanus eremius</i>	Pygmy Desert Goanna
Varanidae	<i>Varanus hamersleyensis</i>	Southern Pilbara Rock Goanna
Varanidae	<i>Varanus tristis</i>	Racehorse Goanna

ALA Search: Amphibians

Family	Species Name	Common Name
Myobatrachidae	<i>Uperoleia russelli</i>	Northwest Toadlet
Hylidae	<i>Cyclorana maini</i>	Sheep Frog
Myobatrachidae	<i>Uperoleia saxatilis</i>	Pilbara Toadlet

ALA Search: Avifauna

Family	Species Name	Common Name
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill
Acanthizidae	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill
Acanthizidae	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone
Acanthizidae	<i>Pyrholaemus brunneus</i>	Redthroat
Acanthizidae	<i>Smicronis brevirostris</i>	Weebill
Accipitridae	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk
Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk
Accipitridae	<i>Aquila audax</i>	Wedge-tailed Eagle
Accipitridae	<i>Circus assimilis</i>	Spotted Harrier
Accipitridae	<i>Elanus axillaris</i>	Black-shouldered Kite
Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite
Accipitridae	<i>Hieraaetus morphnoides</i>	Little Eagle
Accipitridae	<i>Milvus migrans</i>	Black Kite
Acrocephalidae	<i>Acrocephalus australis</i>	Australian Reed-Warbler
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owllet-Nightjar
Anatidae	<i>Anas gracilis</i>	Grey Teal
Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck
Anatidae	<i>Aythya australis</i>	Hardhead
Anatidae	<i>Chenonetta jubata</i>	Australian Wood Duck
Anatidae	<i>Cygnus atratus</i>	Black Swan
Anatidae	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck
Anhingiidae	<i>Anhinga novaehollandiae</i>	Australasian Darter
Anseranatidae	<i>Anseranas semipalmata</i>	Magpie Goose
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift
Ardeidae	<i>Ardea modesta</i>	Eastern Great Egret
Ardeidae	<i>Ardea pacifica</i>	White-necked Heron
Ardeidae	<i>Egretta novaehollandiae</i>	White-faced Heron
Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen Night-Heron
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow
Artamidae	<i>Artamus minor</i>	Little Woodswallow
Artamidae	<i>Artamus personatus</i>	Masked Woodswallow
Artamidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird
Artamidae	<i>Cracticus tibicen</i>	Australian Magpie
Artamidae	<i>Cracticus torquatus</i>	Grey Butcherbird
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew
Cacatuidae	<i>Cacatua sanguinea</i>	Little Corella
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah
Cacatuidae	<i>Nymphicus hollandicus</i>	Cockatiel
Campephagidae	<i>Coracina maxima</i>	Ground Cuckoo-shrike
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
Campephagidae	<i>Lalage sueurii</i>	White-winged Triller
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu
Charadriidae	<i>Elsayornis melanops</i>	Black-fronted Dotterel
Climacteridae	<i>Climacteris melanura</i>	Black-tailed Treecreeper
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove
Columbidae	<i>Geopelia striata</i>	Peaceful Dove
Columbidae	<i>Geophaps plumifera</i>	Spinifex Pigeon
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing
Corvidae	<i>Corvus bennetti</i>	Little Crow
Corvidae	<i>Corvus orru</i>	Torresian Crow
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo
Cuculidae	<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo
Cuculidae	<i>Chalcites osculans</i>	Black-eared Cuckoo
Estrildidae	<i>Emblema pictum</i>	Painted Finch
Estrildidae	<i>Neochmia ruficauda</i>	Star Finch
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch
Eupetidae	<i>Cinclosoma castaneothorax</i>	Chestnut-breasted Quail-thrush
Eupetidae	<i>Psophodes occidentalis</i>	Chiming Wedgebill
Eurostopodidae	<i>Eurostopodus argus</i>	Spotted Nightjar
Falconidae	<i>Falco berigora</i>	Brown Falcon
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel
Falconidae	<i>Falco longipennis</i>	Australian Hobby
Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon
Halcyonidae	<i>Dacelo leachii</i>	Blue-winged Kookaburra
Halcyonidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher
Halcyonidae	<i>Todiramphus sanctus</i>	Sacred Kingfisher
Hirundinidae	<i>Petrochelidon ariel</i>	Fairy Martin
Hirundinidae	<i>Petrochelidon nigricans</i>	Tree Martin

ALA Search: Avifauna

Family	Species Name	Common Name
Maluridae	<i>Amytornis striatus</i>	Striated Grasswren
Maluridae	<i>Malurus lamberti</i>	Variiegated Fairy-wren
Maluridae	<i>Malurus leucopterus</i>	White-winged Fairy-wren
Maluridae	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren
Megaluridae	<i>Cincloramphus cruralis</i>	Brown Songlark
Megaluridae	<i>Cincloramphus mathewsi</i>	Rufous Songlark
Megaluridae	<i>Eremionis carteri</i>	Spinifexbird
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater
Meliphagidae	<i>Epthianura tricolor</i>	Crimson Chat
Meliphagidae	<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater
Meliphagidae	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater
Meliphagidae	<i>Lichmera indistincta</i>	Brown Honeyeater
Meliphagidae	<i>Manorina flavigula</i>	Yellow-throated Miner
Meliphagidae	<i>Melithreptus gularis</i>	Black-chinned Honeyeater
Meliphagidae	<i>Purnella albifrons</i>	White-fronted Honeyeater
Meliphagidae	<i>Sugomel niger</i>	Black Honeyeater
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit
Nectariniidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird
Otididae	<i>Ardeotis australis</i>	Australian Bustard
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-Thrush
Pachycephalidae	<i>Oreoica gutturalis</i>	Crested Bellbird
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote
Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian Pelican
Petroicidae	<i>Melanodryas cucullata</i>	Hooded Robin
Petroicidae	<i>Petroica goodenovii</i>	Red-capped Robin
Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant
Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth
Podicipedidae	<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe
Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe
Pomatostomidae	<i>Pomatostomus superciliosus</i>	White-browed Babbler
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar
Psittacidae	<i>Neophema elegans</i>	Elegant Parrot
Psittacidae	<i>Neopsephotus bourkii</i>	Bourke's Parrot
Ptilonorhynchidae	<i>Ptilonorhynchus guttatus</i>	Western Bowerbird
Rallidae	<i>Fulica atra</i>	Eurasian Coot
Rallidae	<i>Tribonyx ventralis</i>	Black-tailed Native-hen
Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper
Scolopacidae	<i>Gallinago megala</i>	Swinhoe's Snipe
Strigidae	<i>Ninox connivens</i>	Barking Owl
Strigidae	<i>Ninox novaeseelandiae</i>	Southern Boobook
Threskiornithidae	<i>Threskiornis spinicollis</i>	Straw-necked Ibis
Turnicidae	<i>Turnix velox</i>	Little Button-quail
Tytonidae	<i>Tyto javanica</i>	Eastern Barn Owl

ALA Search: Mammals

Family	Species Name	Common Name
Dasyuridae	<i>Dasykaluta rosamondae</i>	Little Red Kaluta
Dasyuridae	<i>Ningaiu timealeyi</i>	Pilbara Ningai
Dasyuridae	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus
Dasyuridae	<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart
Dasyuridae	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart
Emballonuridae	<i>Taphozous georgianus</i>	Common Sheath-tailed Bat
Emballonuridae	<i>Taphozous hilli</i>	Hill's Sheath-tailed Bat
Molossidae	<i>Ozimops lumsdenae</i>	Northern Free-tailed bat
Muridae	<i>Leggadina lakedownensis</i>	Short-tailed Mouse
Muridae	<i>Mus musculus</i>	House Mouse
Muridae	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse
Muridae	<i>Pseudomys desertor</i>	Desert Mouse
Muridae	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse
Muridae	<i>Zyomys argurus</i>	Common Rock-rat
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
Vespertilionidae	<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat

ALA Search: Invertebrates

Phylum - matched	Class - matched	Order - matched	Family - matched	Genus	Species
ARTHROPODA	ARACHNIDA	ARANEAE	ACTINOPODIDAE	<i>Missulena</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	ARANEIDAE	<i>Argiope</i>	<i>Argiope protensa</i>
ARTHROPODA	ARACHNIDA	ARANEAE	BARYCHELIDAE	<i>Aureocrypta</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	BARYCHELIDAE	<i>Idiommata</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	BARYCHELIDAE	<i>Synothele</i>	<i>Synothele karara</i>
ARTHROPODA	ARACHNIDA	ARANEAE	BARYCHELIDAE	<i>Synothele</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	CLUBIONIDAE	<i>Clubiona</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	CORINNIDAE	<i>Supunna</i>	<i>Supunna funerea</i>
ARTHROPODA	ARACHNIDA	ARANEAE	CORINNIDAE	<i>Supunna</i>	<i>Supunna picta</i>
ARTHROPODA	ARACHNIDA	ARANEAE	CORINNIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	CTENIZIDAE	<i>Conothele</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	DESIDAE	<i>Forsterina</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	DESIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	FILISTATIDAE	<i>Wandella</i>	<i>Wandella waldockae</i>
ARTHROPODA	ARACHNIDA	ARANEAE	GALLIENIELLIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	GNAPHOSIDAE	<i>Eilica</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	GNAPHOSIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	LAMPONIDAE	<i>Asadipus</i>	<i>Asadipus phaleratus</i>
ARTHROPODA	ARACHNIDA	ARANEAE	LAMPONIDAE	<i>Bigenditia</i>	<i>Bigenditia zuytdorp</i>
ARTHROPODA	ARACHNIDA	ARANEAE	LAMPONIDAE	<i>Lampona</i>	<i>Lampona quinqueplagiata</i>
ARTHROPODA	ARACHNIDA	ARANEAE	LAMPONIDAE	<i>Lamponina</i>	<i>Lamponina scutata</i>
ARTHROPODA	ARACHNIDA	ARANEAE	LAMPONIDAE	<i>Lamponina</i>	<i>Lamponina elongata</i>
ARTHROPODA	ARACHNIDA	ARANEAE	LYCOSIDAE	<i>Hoggicosa</i>	<i>Hoggicosa bicolor</i>
ARTHROPODA	ARACHNIDA	ARANEAE	LYCOSIDAE	<i>Hogna</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	LYCOSIDAE	<i>Venator</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	LYCOSIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	MITURGIDAE	<i>Miturga</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	MITURGIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	NEMESIIDAE	<i>Aname</i>	<i>Aname marae</i>
ARTHROPODA	ARACHNIDA	ARANEAE	NEMESIIDAE	<i>Aname</i>	<i>Aname mellosa</i>
ARTHROPODA	ARACHNIDA	ARANEAE	NEMESIIDAE	<i>Aname</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	NEMESIIDAE	<i>Kwonkan</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	NEPHILIDAE	<i>Nephila</i>	<i>Nephila edulis</i>
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE	<i>Cavisternum</i>	<i>Cavisternum clavatum</i>
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE	<i>Grymeus</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE	<i>Opopaea</i>	<i>Opopaea pallida</i>
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE	<i>Opopaea</i>	<i>Opopaea pilbara</i>
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE	<i>Opopaea</i>	<i>Opopaea wheelarra</i>

ALA Search: Invertebrates

Phylum - matched	Class - matched	Order - matched	Family - matched	Genus	Species
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE	<i>Opopaea</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE	<i>Xestaspis</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	OONOPIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	OXYOPIDAE	<i>Oxyopes</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	OXYOPIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	PHOLCIDAE	<i>Trichocyclus</i>	<i>Trichocyclus nigropunctatus</i>
ARTHROPODA	ARACHNIDA	ARANEAE	PHOLCIDAE	<i>Trichocyclus</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	PRODIDOMIDAE	<i>Cryptoerithus</i>	<i>Cryptoerithus halli</i>
ARTHROPODA	ARACHNIDA	ARANEAE	PRODIDOMIDAE	<i>Cryptoerithus</i>	<i>Cryptoerithus occultus</i>
ARTHROPODA	ARACHNIDA	ARANEAE	PRODIDOMIDAE	<i>Wesmaldra</i>	<i>Wesmaldra nixaut</i>
ARTHROPODA	ARACHNIDA	ARANEAE	PRODIDOMIDAE	<i>Wydundra</i>	<i>Wydundra barrow</i>
ARTHROPODA	ARACHNIDA	ARANEAE	PRODIDOMIDAE	<i>Wydundra</i>	<i>Wydundra kennedy</i>
ARTHROPODA	ARACHNIDA	ARANEAE	PRODIDOMIDAE	<i>Wydundra</i>	<i>Wydundra solo</i>
ARTHROPODA	ARACHNIDA	ARANEAE	SALTICIDAE	<i>Graynulla</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	SALTICIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	SELENOPIDAE	<i>Karaops</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	SPARASSIDAE	<i>Irileka</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	SPARASSIDAE	<i>Neosparassus</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	SPARASSIDAE	<i>Pediana</i>	<i>Pediana tenuis</i>
ARTHROPODA	ARACHNIDA	ARANEAE	SYMPHYTOGNATHIDAE	<i>Anapistula</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	THOMISIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	TROCHANTERIIDAE	<i>Trachyspina</i>	<i>Trachyspina capensis</i>
ARTHROPODA	ARACHNIDA	ARANEAE	TROCHANTERIIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Cavasteron</i>	<i>Cavasteron tenuicalcar</i>
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Euasteron</i>	<i>Euasteron johannae</i>
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Habronestes</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Leptasteron</i>	<i>Leptasteron platyconductor</i>
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Masasteron</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Spinasteron</i>	<i>Spinasteron barlee</i>
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Spinasteron</i>	<i>Spinasteron knowlesi</i>
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE	<i>Spinasteron</i>	<i>Spinasteron waldockae</i>
ARTHROPODA	ARACHNIDA	ARANEAE	ZODARIIDAE		
ARTHROPODA	ARACHNIDA	ARANEAE	ZORIDAE	<i>Argoctenus</i>	
ARTHROPODA	ARACHNIDA	ARANEAE	ZORIDAE		
ARTHROPODA	ARACHNIDA	PALPIGRADI	EUKOENENIIDAE		
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	ATEMNIDAE	<i>Oratemnus</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	CHERNETIDAE	<i>Haplochernes</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	CHERNETIDAE	<i>Nesidiochernes</i>	

ALA Search: Invertebrates

Phylum - matched	Class - matched	Order - matched	Family - matched	Genus	Species
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	CHERNETIDAE	<i>Troglochernes</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	CHERNETIDAE		
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	CHTHONIIDAE	<i>Austrochthonius</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	CHTHONIIDAE	<i>Tyrannochthonius</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	GARYPIDAE	<i>Synsphyronus</i>	<i>Synsphyronus heptatrichus</i>
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	GARYPIDAE	<i>Synsphyronus</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	HYIDAE	<i>Indohya</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	OLPIIDAE	<i>Austrohorus</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	OLPIIDAE	<i>Beierolpium</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	OLPIIDAE	<i>Euryolpium</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	OLPIIDAE	<i>Indolpium</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	OLPIIDAE		
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES	STERNOPHORIDAE	<i>Afrostermophorus</i>	
ARTHROPODA	ARACHNIDA	PSEUDOSCORPIONES			
ARTHROPODA	ARACHNIDA	SCHIZOMIDA	HUBBARDIIDAE	<i>Draculoides</i>	
ARTHROPODA	ARACHNIDA	SCHIZOMIDA	HUBBARDIIDAE		
ARTHROPODA	ARACHNIDA	SCORPIONES	BUTHIDAE	<i>Lychas</i>	
ARTHROPODA	ARACHNIDA	SCORPIONES	URODACIDAE	<i>Urodacus</i>	<i>Urodacus megamastigus</i>
ARTHROPODA	ARACHNIDA	SCORPIONES	URODACIDAE	<i>Urodacus</i>	
ARTHROPODA	ARACHNIDA	TROMBIDIFORMES	ANYSTIDAE		
ARTHROPODA	ARACHNIDA	TROMBIDIFORMES	ARRENURIDAE	<i>Arrenurus</i>	
ARTHROPODA	ARACHNIDA	TROMBIDIFORMES	MIDEOPSIDAE	<i>Tillia</i>	
ARTHROPODA	CHILOPODA	GEOPHILOMORPHA	CHILENOPHILIDAE		
ARTHROPODA	CHILOPODA	GEOPHILOMORPHA	MECISTOCEPHALIDAE	<i>Mecistocephalus</i>	
ARTHROPODA	CHILOPODA	GEOPHILOMORPHA	ORYIDAE	<i>Orphnaeus</i>	<i>Orphnaeus brevilabiatus</i>
ARTHROPODA	CHILOPODA	SCOLOPENDROMORPHA	CRYPTOPIDAE	<i>Cryptops</i>	
ARTHROPODA	CHILOPODA	SCOLOPENDROMORPHA			
ARTHROPODA	CHILOPODA	SCUTIGEROMORPHA	SCUTIGERIDAE	<i>Allothereua</i>	<i>Allothereua lesueri</i>
ARTHROPODA	CHILOPODA	SCUTIGEROMORPHA	SCUTIGERIDAE	<i>Pesvarus</i>	
ARTHROPODA	CHILOPODA	SCUTIGEROMORPHA	SCUTIGERIDAE	<i>Pilbarascutigera</i>	
ARTHROPODA	CHILOPODA	SCUTIGEROMORPHA	SCUTIGERIDAE		
ARTHROPODA	CHILOPODA	SCUTIGEROMORPHA			
ARTHROPODA	DIPLOPODA	POLYDESMIDA	HAPLODESMIDAE		
ARTHROPODA	DIPLOPODA	POLYXENIDA	LOPHOPROCTIDAE		
ARTHROPODA	DIPLOPODA	POLYXENIDA	POLYXENIDAE	<i>Unixenus</i>	
ARTHROPODA	DIPLOPODA	POLYXENIDA	SYNXENIDAE	<i>Phryssonotus</i>	<i>Phryssonotus novaehollandiae</i>
ARTHROPODA	DIPLOPODA	POLYZONIIDA	SIPHONOTIDAE		
ARTHROPODA	DIPLOPODA	SPIROBOLIDA	TRIGONIULIDAE	<i>Austrostrophus</i>	<i>Austrostrophus stictopygus</i>

ALA Search: Invertebrates

Phylum - matched	Class - matched	Order - matched	Family - matched	Genus	Species
ARTHROPODA	DIPLOPODA	SPIROBOLIDA	TRIGONIULIDAE	<i>Austrostrophus</i>	
ARTHROPODA	INSECTA	BLATTODEA	RHINOTERMITIDAE	<i>Heterotermes</i>	<i>Heterotermes venustus</i>
ARTHROPODA	INSECTA	COLEOPTERA	BOSTRICHIDAE	<i>Bostrychopsis</i>	<i>Bostrychopsis jesuita</i>
ARTHROPODA	INSECTA	COLEOPTERA	BUPRESTIDAE	<i>Neospades</i>	<i>Neospades chrysopygia</i>
ARTHROPODA	INSECTA	COLEOPTERA	BUPRESTIDAE	<i>Temognatha</i>	<i>Temognatha tricolorata</i>
ARTHROPODA	INSECTA	COLEOPTERA	CURCULIONIDAE	<i>Emplesis</i>	<i>Emplesis assimilis</i>
ARTHROPODA	INSECTA	COLEOPTERA	CURCULIONIDAE	<i>Myllocerus</i>	<i>Myllocerus exilis</i>
ARTHROPODA	INSECTA	COLEOPTERA	ELATERIDAE	<i>Agrypnus</i>	<i>Agrypnus perplexus</i>
ARTHROPODA	INSECTA	COLEOPTERA	SCARABAEIDAE	<i>Lepanus</i>	
ARTHROPODA	INSECTA	COLEOPTERA	SCARABAEIDAE	<i>Onthophagus</i>	
ARTHROPODA	INSECTA	COLEOPTERA	STAPHYLINIDAE	<i>Ochtheophilum</i>	<i>Ochtheophilum mastersii</i>
ARTHROPODA	INSECTA	HEMIPTERA	CICADELLIDAE	<i>Austroasca</i>	<i>Austroasca histrioncula</i>
ARTHROPODA	INSECTA	HEMIPTERA	CICADELLIDAE	<i>Balclutha</i>	
ARTHROPODA	INSECTA	HEMIPTERA	CICADELLIDAE	<i>Nesoclutha</i>	<i>Nesoclutha phryne</i>
ARTHROPODA	INSECTA	HEMIPTERA	CICADELLIDAE	<i>Orosius</i>	<i>Orosius lotophagorum</i>
ARTHROPODA	INSECTA	HEMIPTERA	CICADELLIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA	BRACONIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA	CERAPHRONIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA	DIAPRIIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA	DRYINIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA	FORMICIDAE	<i>Iridomyrmex</i>	<i>Iridomyrmex viridiaeneus</i>
ARTHROPODA	INSECTA	HYMENOPTERA	FORMICIDAE	<i>Myrmecia</i>	<i>Myrmecia nigriceps</i>
ARTHROPODA	INSECTA	HYMENOPTERA	HALICTIDAE	<i>Lasioglossum</i>	<i>Lasioglossum (Chilalictus) hemichalceum</i>
ARTHROPODA	INSECTA	HYMENOPTERA	MEGACHILIDAE	<i>Megachile</i>	
ARTHROPODA	INSECTA	HYMENOPTERA	MUTILLIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA	SCELIONIDAE	<i>Scelio</i>	
ARTHROPODA	INSECTA	HYMENOPTERA	SCELIONIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA	VESPIDAE		
ARTHROPODA	INSECTA	HYMENOPTERA			
ARTHROPODA	INSECTA	LEPIDOPTERA	LYCAENIDAE	<i>Jalmenus</i>	<i>Jalmenus clementi</i>
ARTHROPODA	INSECTA	LEPIDOPTERA	LYCAENIDAE	<i>Zizina</i>	<i>Zizina otis</i>
ARTHROPODA	INSECTA	LEPIDOPTERA	LYCAENIDAE	<i>Zizula</i>	<i>Zizula hylax</i>
ARTHROPODA	INSECTA	LEPIDOPTERA	PIERIDAE	<i>Eurema</i>	<i>Eurema smilax</i>
ARTHROPODA	INSECTA	LEPIDOPTERA			
ARTHROPODA	MALACOSTRACA	ISOPODA	CIROLANIDAE	<i>Kagalana</i>	<i>Kagalana tonde</i>

WAM SRE Molluscs Database Search: commissioned 1/9/2015 for Astron, between -22.203737°, 116.745811° and -22.995176°, 117.783023°

SRE CRITERIA	REGNO	CLASS	SUBCLASS	FAMILY	GENUS	SPECIES	DTMNDBY	DTMNDDT	NEAREST	LATITUDE	LONGITUDE	DTFR	LATDEC
Potential SRE (A,D,E)	81617	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2013	TOM PRICE	22°18'26.37"S	116°48'20.37"E	15/04/2013	-22.3073
Potential SRE (A,D,E)	67244	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67245	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67246	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67247	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67248	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67249	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67250	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67251	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67252	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67253	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67243	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67334	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°38'27"S	117°42'45"E	10/03/2007	-22.6408
Potential SRE (A,D,E)	83806	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2012	TOM PRICE	22°49'14.27"S	117°31'16.76"E	18/06/2012	-22.8206
Potential SRE (A,D,E)	81632	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2013	TOM PRICE	22°31'33.18"S	116°48'02.55"E	19/04/2013	-22.5258
Potential SRE (A,D,E)	81642	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2013	TOM PRICE	22°26'35.79"S	116°46'20.88"E	19/04/2013	-22.4432
Potential SRE (A,D,E)	81654	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2013	TOM PRICE	22°35'08.52"S	116°45'29.19"E	18/04/2013	-22.5857
Potential SRE (A,D,E)	81663	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2013	TOM PRICE	22°33'47.74"S	116°45'06.57"E	18/04/2013	-22.5632
Potential SRE (A,D,E)	81733	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2013		22°26'35.79"S	116°46'20.88"E	18/04/2013	-22.4432
Potential SRE (A,D,E)	83295	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.			MT TRUCHANAS	22°58'27.2"S	117°36'40.3"E	10/09/1996	-22.9742
Potential SRE (A,D,E)	83573	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2012	MT FARQUHAR	22°28'53.67"S	116°48'38.79"E	24/04/2012	-22.4815
Potential SRE (A,D,E)	83698	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2012	MT FARQUAR	22°28'53.67"S	116°48'38.79"E	18/06/2012	-22.4815
Potential SRE (A,D,E)	83700	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2012	MT FARQUAR	22°16'58.50"S	116°53'32.76"E	18/06/2012	-22.2829
Potential SRE (A,D,E)	83830	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.S.	2012	TOM PRICE	22°46'46.30`S	117°39'34.93`E	18/06/2012	-22.7666
Potential SRE (A,D,E)	3793	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.			TOM PRICE	22°37'13.0"S	117°41'10.0"E	05/09/1984	-22.6202
Potential SRE (A,D,E)	67254	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67031	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22.26168°S	117.72722°E	17/02/2007	-22.2616
Potential SRE (A,D,E)	3794	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Kendrick, G.W.		HAMERSLEY HOMESTEAD	22°17`S	117°34`E	00/01/1966	-22.2833
Potential SRE (A,D,E)	30143	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Slack-Smith, S.M.	2001	BROCKMAN MINE	22°16'08.972"S	117°02'09.639"E	00/11/1998	-22.2691
Potential SRE (A,D,E)	61796	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Whisson, C.	2010	SERENITY VALLEY	22°12'51.9"S	117°34'23"E	25/04/2010	-22.2144
Potential SRE (A,D,E)	67027	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22.26168°S	117.72722°E	17/02/2007	-22.2616
Potential SRE (A,D,E)	67028	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22.26168°S	117.72722°E	17/02/2007	-22.2616
Potential SRE (A,D,E)	67242	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67030	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22.26168°S	117.72722°E	17/02/2007	-22.2616
Potential SRE (A,D,E)	9147	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.			ROCKLEA (? ROCKLEE) HOMESTEAD	22°53`S	117°27`E	00/10/1963	-22.8833
Potential SRE (A,D,E)	67173	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22.62983°S	117.71717°E	22/02/2007	-22.6298
Potential SRE (A,D,E)	67174	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22.62983°S	117.71717°E	22/02/2007	-22.6298
Potential SRE (A,D,E)	67218	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	67219	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	67227	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°39'00.2"S	117°43'06.6"E	15/08/2008	-22.6500
Potential SRE (A,D,E)	67029	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22.26168°S	117.72722°E	17/02/2007	-22.2616
Potential SRE (A,D,E)	67220	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	67241	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°40'17"S	117°46'28"E	10/03/2007	-22.6713
Potential SRE (A,D,E)	67228	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°39'00.2"S	117°43'06.6"E	15/08/2008	-22.6500
Potential SRE (A,D,E)	67230	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°39'00.2"S	117°43'06.6"E	15/08/2008	-22.6500
Potential SRE (A,D,E)	67226	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°38'33"S	117°44'43"E	10/03/2007	-22.6425
Potential SRE (A,D,E)	67225	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	67224	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	'Pilbara' sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400

WAM SRE Molluscs Database Search: commissioned 1/9/2015 for Astron, between -22.203737°, 116.745811° and -22.995176°, 117.783023°

SRE CRITERIA	REGNO	CLASS	SUBCLASS	FAMILY	GENUS	SPECIES	DTMNDBY	DTMNDDT	NEAREST	LATITUDE	LONGITUDE	DTFR	LATDEC
Potential SRE (A,D,E)	67223	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	`Pilbara` sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	67222	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	`Pilbara` sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	67221	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	`Pilbara` sp. Nov.	Johnson, M.	2013	PILBARA	22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	67229	Gastropoda	Pulmonata	Bothriembryontidae	Bothriembryon	`Pilbara` sp. Nov.	Johnson, M.	2013	PILBARA	22°39'00.2"S	117°43'06.6"E	15/08/2008	-22.6500
Potential SRE (A,D,E)	81624	Gastropoda	Pulmonata	Camaenidae	Gen. nov.	cf. `small Mount Robinson` sp. Nov.	Whisson, C.S.	2013	TOM PRICE	22°30'22.96"S	116°56'39.00"E	14/04/2013	-22.5063
Potential SRE (A,D,E)	61793	Gastropoda	Pulmonata	Camaenidae	Gen. nov.	sp. nov. `Z`	Whisson, C.	2010	SERENITY VALLEY	22°12'51.9"S	117°34'23"E	24/04/2010	-22.2144
Potential SRE (A,D,E)	83926	Gastropoda	Pulmonata	Camaenidae	Quistrachia	`cancellate` sp. Nov.			TOM PRICE	22°43'12.4"S	117°26'14.1"E	8/10/2012	-22.7201
Potential SRE (A,D,E)	61792	Gastropoda	Pulmonata	Camaenidae	Quistrachia	`cancellate` sp. Nov.	Whisson, C.	2010	SERENITY VALLEY	22°12'51.9"S	117°34'23"E	24/04/2010	-22.2144
Potential SRE (A,D,E)	42678	Gastropoda	Pulmonata	Camaenidae	Quistrachia	sp.	Whisson, C.S.	2008	TOM PRICE	22°38'27"S	117°42'45"E	15/08/2008	-22.6408
Potential SRE (A,D,E)	5700	Gastropoda	Pulmonata	Camaenidae	Quistrachia	sp.	Solem, A.		12 KM WEST OF TOM PRICE	22°42'S	117°40'E	05/09/1984	-22.7000
Potential SRE (A,D,E)	42670	Gastropoda	Pulmonata	Camaenidae	Quistrachia?	sp.	Whisson, C.S.	2008	TOM PRICE	22°39'00.2"S	117°43'06.6"E	15/08/2008	-22.6500
Potential SRE (A,D,E)	82834	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Beasley` sp. Nov.	Hamilton, Z.R.			22°14'20"S	117°21'42"E	13/02/2007	-22.2388
Potential SRE (A,D,E)	82835	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Beasley` sp. Nov.	Hamilton, Z.R.			22°40'20"S	117°21'42"E	13/02/2007	-22.6722
Potential SRE (A,D,E)	82831	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Beasley` sp. Nov.	Hamilton, Z.R.			22°24'31"S	117°16'18"E	14/11/2009	-22.4086
Potential SRE (A,D,E)	82830	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Beasley` sp. Nov.	Hamilton, Z.R.			22°24'31"S	117°16'18"E	14/11/2009	-22.4086
Potential SRE (A,D,E)	82833	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Pannawonica` sp. Nov.	Hamilton, Z.R.			22°35'10"S	117°10'24"E	10/02/2007	-22.5861
Potential SRE (A,D,E)	82832	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Pannawonica` sp. Nov.	Hamilton, Z.R.			22°35'10"S	117°10'24"E	10/02/2007	-22.5861
Potential SRE (A,D,E)	83145	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°46'4.68"S	117°29'56.99"E	4/10/2011	-22.7679
Potential SRE (A,D,E)	83138	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'53.51"S	117°29'59.88"E	4/10/2011	-22.8148
Potential SRE (A,D,E)	83131	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'53.51"S	117°29'59.88"E	4/10/2011	-22.8148
Potential SRE (A,D,E)	83129	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'53.51"S	117°29'59.88"E	4/10/2011	-22.8148
Potential SRE (A,D,E)	83128	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'39.57"S	117°29'8.03"E	25/09/2011	-22.8109
Potential SRE (A,D,E)	83125	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'48.23"S	117°28'43.29"E	3/10/2011	-22.8134
Potential SRE (A,D,E)	83124	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'29.32"S	117°28'37.29"E	25/09/2011	-22.8081
Potential SRE (A,D,E)	80998	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'40.23"S	117°29'6.80"E	29/09/2011	-22.8111
Potential SRE (A,D,E)	61191	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	CROSSING BORE	22°18'05.4"S	117°21'11.1"E	2/10/2005	-22.3015
Potential SRE (A,D,E)	65771	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	CENTRAL PILBARA	22°17'59"S	117°38'16"E	21/03/2011	-22.2997
Potential SRE (A,D,E)	80984	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'36.54"S	117°28'24.42"E	5/10/2011	-22.8101
Potential SRE (A,D,E)	65784	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	CENTRAL PILBARA	22°13'41"S	117°31'04"E	21/03/2011	-22.2280
Potential SRE (A,D,E)	80992	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'36.54"S	117°28'24.42"E	5/10/2011	-22.8101
Potential SRE (A,D,E)	80997	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'40.23"S	117°29'6.80"E	29/09/2011	-22.8111
Potential SRE (A,D,E)	80993	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°46'26.00"S	117°30'12.06"E	24/09/2011	-22.7738
Potential SRE (A,D,E)	80994	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°46'26.00"S	117°30'12.06"E	24/09/2011	-22.7738
Potential SRE (A,D,E)	80996	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'36.62"S	117°28'10.98"E	9/11/2011	-22.8101
Potential SRE (A,D,E)	80999	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°49'25.55"S	117°29'33.36"E	24/09/2011	-22.8237
Potential SRE (A,D,E)	80995	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°50'30"S	117°30'09.0"E	28/09/2011	-22.8416
Potential SRE (A,D,E)	82837	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Tom Price` sp. Nov.	Hamilton, Z.R.			22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	82836	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Tom Price` sp. Nov.	Hamilton, Z.R.			22°38'24"S	117°42'32"E	10/03/2007	-22.6400
Potential SRE (A,D,E)	82829	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Tom Price` sp. Nov.	Hamilton, Z.R.			22°14'20"S	117°06'04"E	10/05/2009	-22.2388
Potential SRE (A,D,E)	82828	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Tom Price` sp. Nov.	Hamilton, Z.R.			22°14'20"S	117°06'04"E	10/05/2009	-22.2388
Potential SRE (A,D,E)	83588	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUHAR	22°27'13.90"S	116°46'11.68"E	24/04/2012	-22.4538
Potential SRE (A,D,E)	83589	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUHAR	22°16'15.60"S	116°54'54.25"E	24/04/2012	-22.2710
Potential SRE (A,D,E)	83590	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUHAR	22°29'35.85"S	116°52'4.54"E	24/04/2012	-22.4932
Potential SRE (A,D,E)	83591	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°28'31.05"S	117°14'34.95"E	24/04/2012	-22.4752
Potential SRE (A,D,E)	83592	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUHAR	22°28'53.67"S	116°48'38.79"E	24/04/2012	-22.4815
Potential SRE (A,D,E)	83593	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°28'53.47"S	117°14'18.22"E	24/04/2012	-22.4815
Potential SRE (A,D,E)	83594	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUHAR	22°29'35.85"S	116°52'4.54"E	24/04/2012	-22.4932
Potential SRE (A,D,E)	83595	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°30'27.03"S	117°12'15.83"E	24/04/2012	-22.5075
Potential SRE (A,D,E)	83598	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°28'31.05"S	117°14'34.95"E	24/04/2012	-22.4752

WAM SRE Molluscs Database Search: commissioned 1/9/2015 for Astron, between -22.203737°, 116.745811° and -22.995176°, 117.783023°

SRE CRITERIA	REGNO	CLASS	SUBCLASS	FAMILY	GENUS	SPECIES	DTMNDBY	DTMNDDT	NEAREST	LATITUDE	LONGITUDE	DTFR	LATDEC
Potential SRE (A,D,E)	83597	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°30'27.03"S	117°12'15.83"E	24/04/2012	-22.5075
Potential SRE (A,D,E)	83587	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°32'3.03"S	117°9'37.90"E	24/04/2012	-22.5341
Potential SRE (A,D,E)	83599	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°25'52.67"S	117°16'35.78"E	24/04/2012	-22.4313
Potential SRE (A,D,E)	83736	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUAR	22°27'13.90"S	116°46'11.68"E	18/06/2012	-22.4538
Potential SRE (A,D,E)	83735	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°28'53.47"S	117°14'18.22"E	18/06/2012	-22.4815
Potential SRE (A,D,E)	83927	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi			TOM PRICE	22°44'49.3"S	117°29'44.5"E	9/10/2012	-22.7470
Potential SRE (A,D,E)	83839	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	TOM PRICE	22°43'15.82"S	117°34'13.36"E	18/06/2012	-22.7210
Potential SRE (A,D,E)	83834	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	TOM PRICE	22°44'56.78"S	117°31'3.63"E	26/04/2012	-22.7491
Potential SRE (A,D,E)	83814	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	TOM PRICE	22°42'53.13"S	117°32'28.95"E	18/06/2012	-22.7147
Potential SRE (A,D,E)	83808	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	TOM PRICE	22°43'9.18"S	117°34'10.43"E	26/04/2012	-22.7192
Potential SRE (A,D,E)	83748	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°30'27.03"S	117°12'15.83"E	18/06/2012	-22.5075
Potential SRE (A,D,E)	83734	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUAR	22°15'34.04"S	117°2'27.64"E	24/04/2012	-22.2594
Potential SRE (A,D,E)	83738	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°31'11.92"S	117°7'17.83"E	18/06/2012	-22.5199
Potential SRE (A,D,E)	83601	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°25'52.67"S	117°16'35.78"E	24/04/2012	-22.4313
Potential SRE (A,D,E)	83732	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°30'27.03"S	117°12'15.83"E	18/06/2012	-22.5075
Potential SRE (A,D,E)	83730	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUAR	22°16'58.50"S	116°53'32.76"E	18/06/2012	-22.2829
Potential SRE (A,D,E)	83725	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°32'3.03"S	117°9'37.90"E	18/06/2012	-22.5341
Potential SRE (A,D,E)	83724	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°30'27.03"S	117°12'15.83"E	18/06/2012	-22.5075
Potential SRE (A,D,E)	83723	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°28'31.05"S	117°14'34.95"E	18/06/2012	-22.4752
Potential SRE (A,D,E)	83722	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°25'52.67"S	117°16'35.78"E	18/06/2012	-22.4313
Potential SRE (A,D,E)	83721	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUAR	22°16'38.23"S	116°56'34.09"E	18/06/2012	-22.2772
Potential SRE (A,D,E)	83717	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT FARQUAR	22°28'53.67"S	116°48'38.79"E	18/06/2012	-22.4815
Potential SRE (A,D,E)	83716	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°25'52.67"S	117°16'35.78"E	18/06/2012	-22.4313
Potential SRE (A,D,E)	83602	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°31'11.92"S	117°7'17.83"E	24/04/2012	-22.5199
Potential SRE (A,D,E)	83739	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2012	MT BROCKMAN	22°28'31.05"S	117°14'34.95"E	18/06/2012	-22.4752
Potential SRE (A,D,E)	81618	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013	TOM PRICE	22°18'26.37"S	116°48'20.37"E	15/04/2013	-22.3073
Potential SRE (A,D,E)	65782	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.	2011	CENTRAL PILBARA	22°12'26"S	117°31'01"E	21/03/2011	-22.2072
Potential SRE (A,D,E)	81734	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013		22°26'35.79"S	116°46'20.88"E	30/05/2013	-22.4432
Potential SRE (A,D,E)	81740	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013		22°32'42.91"S	116°46'13.83"E	18/04/2013	-22.5452
Potential SRE (A,D,E)	81731	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013		22°35'04.69"S	117°00'45.21"E	18/04/2013	-22.5846
Potential SRE (A,D,E)	81730	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013		22°26'06.83"S	116°47'03.70"E	18/04/2013	-22.4352
Potential SRE (A,D,E)	81729	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013		22°30'27.72"S	116°48'26.64"E	18/04/2013	-22.5077
Potential SRE (A,D,E)	81656	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013	TOM PRICE	22°30'38.55"S	117°14'46.02"E	14/04/2013	-22.5107
Potential SRE (A,D,E)	81655	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013	TOM PRICE	22°35'08.52"S	116°45'29.19"E	18/04/2013	-22.5857
Potential SRE (A,D,E)	81643	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013	TOM PRICE	22°26'35.79"S	116°46'20.88"E	19/04/2013	-22.4432
Potential SRE (A,D,E)	81623	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013	TOM PRICE	22°30'22.96"S	116°56'39.00"E	14/04/2013	-22.5063
Potential SRE (A,D,E)	81633	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013	TOM PRICE	22°31'33.18"S	116°48'02.55"E	19/04/2013	-22.5258
Potential SRE (A,D,E)	81639	Gastropoda	Pulmonata	Camaenidae	Rhagada	cf. radleyi	Whisson, C.S.	2013	TOM PRICE	22°32'17.40"S	116°52'11.71"E	19/04/2013	-22.5381
Potential SRE (A,D,E)	6030	Gastropoda	Pulmonata	Camaenidae	Rhagada	radleyi			CHINDERWARRINER POOL	22°35'S	117°04'E	06/09/1983	-22.5833
Potential SRE (A,D,E)	88287	Gastropoda	Pulmonata	Camaenidae	Rhagada	sp.		2014	TOM PRICE	22°37'33.88"S	117°37'05.52"E	12/04/2014	-22.6260
Potential SRE (A,D,E)	88288	Gastropoda	Pulmonata	Camaenidae	Rhagada	sp.		2014	TOM PRICE	22°37'27.46"S	117°35'41.75"E	14/04/2014	-22.6242
Potential SRE (A,D,E)	30145	Gastropoda	Pulmonata	Camaenidae	Rhagada	sp.	Whisson, C.S.	2013	BROCKMAN MINE	22°16'08.9"S	117°02'9.6"E	00/11/1998	-22.2691
Potential SRE (A,D,E)	30140	Gastropoda	Pulmonata	Camaenidae	Rhagada	sp.	Whisson, C.S.	2013	MT BROCKMAN	22°18'S	117°18'E	00/11/1999	-22.3000
Potential SRE (A,D,E)	6225	Gastropoda	Pulmonata	Camaenidae	Rhagada	sp.			MOUNT TURNER	22°42'S	117°25'E	28/05/1965	-22.7000
Potential SRE (A,D,E)	6178	Gastropoda	Pulmonata	Camaenidae	Rhagada	sp.	Kendrick, G.W.		HAMERSLEY STATION	22°17'S	117°41'E	00/01/1966	-22.2833
Potential SRE (A,D,E)	6129	Gastropoda	Pulmonata	Camaenidae	Rhagada	sp.			TOM PRICE	22°42'S	117°40'E	05/09/1984	-22.7000

WAM SRE Molluscs Database Search: commissioned 1/9/2015 for Astron, between -22.203737°, 116.745811° and -22.995176°, 117.783023°

SRE CRITERIA	REGNO	CLASS	SUBCLASS	FAMILY	GENUS	SPECIES	DTMNDBY	DTMNDDT	NEAREST	LATITUDE	LONGITUDE	DTFR	LATDEC
Potential SRE (A,D,E)	30742	Gastropoda	Pulmonata	Camaenidae	Rhagada	`Mt Brockman` sp. Nov.	Whisson, C.S.	2009		22°37'04"S	117°10'54"E	00/10/2004	-22.6177
Potential SRE (A,D,E)	65835	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°22'43.27"S	117°26'53.17"E	21/03/2011	-22.3786
Potential SRE (A,D,E)	65833	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°22'43.27"S	117°26'53.17"E	21/03/2011	-22.3786
Potential SRE (A,D,E)	65832	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°22'43.27"S	117°26'53.17"E	21/03/2011	-22.3786
Potential SRE (A,D,E)	65831	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°22'24.49"S	117°27'47.13"E	21/03/2011	-22.3734
Potential SRE (A,D,E)	65827	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°22'47.76"S	117°22'53.36"E	21/03/2011	-22.3799
Potential SRE (A,D,E)	65825	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°21'15.04"S	117°36'49.11"E	21/03/2011	-22.3541
Potential SRE (A,D,E)	65826	Gastropoda	Pulmonata	Camaenidae	Rhagada	`small banded` sp. Nov.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°22'43.27"S	117°26'53.17"E	21/03/2011	-22.3786
Potential SRE (A,E)	81638	Gastropoda	Pulmonata	Planorbidae	Bayardella	cf. johni	Whisson, C.S.	2013	TOM PRICE	22°32'10.91"S	117°03'12.73"E	14/04/2013	-22.5363
Potential SRE (A,E)	65773	Gastropoda	Pulmonata	Planorbidae	Glyptophysa	sp.	Whisson, C.	2011	CENTRAL PILBARA	22°19'12"S	117°37'10"E	21/03/2011	-22.3200
Potential SRE (A,E)	83823	Gastropoda	Pulmonata	Planorbidae	Gyraulus	sp.	Whisson, C.S.	2012	TOM PRICE	22°53'4.54"S	117°30'18.52"E	18/06/2012	-22.8845
Potential SRE (A,E)	65763	Gastropoda	Pulmonata	Planorbidae	Gyraulus	sp.	Whisson, C.	2011	CENTRAL PILBARA	22°23'08"S	117°28'00"E	21/03/2011	-22.3855
Potential SRE (A,E)	83143	Gastropoda	Pulmonata	Planorbidae	Gyraulus	sp.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'44.18"S	117°30'5.22"E	4/10/2011	-22.8122
Potential SRE (A,E)	83833	Gastropoda	Pulmonata	Planorbidae	Gyraulus	sp.	Whisson, C.S.	2012	TOM PRICE	22°44'56.78"S	117°31'3.63"E	26/04/2012	-22.7491
Potential SRE (A,E)	83152	Gastropoda	Pulmonata	Planorbidae	Gyraulus	sp.	Whisson, C.S.	2011	ROCKLEA HOMESTEAD	22°48'44.18"S	117°30'5.22"E	4/10/2011	-22.8122
Potential SRE (A,E)	83807	Gastropoda	Pulmonata	Planorbidae	Gyraulus	sp.	Whisson, C.S.	2012	TOM PRICE	22°49'14.27"S	117°31'16.76"E	18/06/2012	-22.8206
Potential SRE (A,E)	81872	Gastropoda	Pulmonata	Succineidae	Succinea	sp.	Whisson, C.S.	2013	TOM PRICE	22°20'48.05"S	117°38'18.59"E	3/05/2013	-22.3466
Potential SRE (A,E)	65760	Gastropoda	Pulmonata	Succineidae	Succinea	sp.	Whisson, C.	2011	CENTRAL PILBARA	22°19'12"S	117°37'10"E	21/03/2011	-22.3200
Potential SRE (A,E)	65772	Gastropoda	Pulmonata	Succineidae	Succinea	sp.	Whisson, C.	2011	CENTRAL PILBARA	22°19'12"S	117°37'10"E	21/03/2011	-22.3200
Potential SRE (A,E)	65828	Gastropoda	Pulmonata	Succineidae	Succinea	sp.	Whisson, C.	2011	NAMMULDI SILVERGRASS	22°24'37.55"S	117°34'19.39"E	21/03/2011	-22.4104
Potential SRE (A,E)	81861	Gastropoda	Pulmonata	Succineidae	Succinea	sp.	Whisson, C.S.	2013	TOM PRICE	22°21'15.79"S	117°37'15.34"E	3/05/2013	-22.3543

LONGDEC	SUBSTRATE	VEGETATION	HABITAT	COLLTOR	COLLMETH	STORAGE	SPECNUM	FIXED	PRESERVED
116.8057			gully sides	Leung, A.	Foraging	Dry	8		
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7125				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.5213	sandy loam, loose soil	Mulga and buffelgrass	plain	E. Volschenk	Litter Sifting	Dry	6		
116.8007			gorge sides, gorge base	Leung, A.	Litter sifting	Dry	1		
116.7725			plain	Leung, A.	Foraging	Dry	1		
116.7581			midslope, gully sides	Leung, A.	Foraging	Dry	1		
116.7518			gully base, gorge base	Leung, A.	Foraging	Dry	1		
116.7725			plain	Leung, A.	Wet pitfall	Wet	1	Propylene Glycol	100% Ethanol
117.6112	Red brown soil over basalt rock	Low scrub of Acacia spp.; Eucalytp; Triodia spp.		Van Leeuwen, S.	Hand	Dry	3		
116.8108	sandy clay	mulga	gully sides	Phoenix	Foraging	Dry	4		
116.8108	sandy clay, loose soil, coarse gravel, stones/boulders	mulga and buffelgrass	gully sides	P. Langlands	Foraging	Dry	7		
116.8924	sandy clay, coarse gravel, stones/boulders	Acacia (not mulga) and spinifex	gully base	P. Langlands	Foraging	Dry	1		
117.6500	sandy loam, gravel, high rock, chirt, ferrous not BIF	Ficus	sloping gorge base	E.S. Volschenk	Litter Sifting	Dry	4		
117.6861				Kendrick, G.W.	Hand	Dry	1		
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7272				MSJ, RT, ZH, SP		Wet	1	Freezer (-80C)	100% Ethanol
117.5667	Deep red alluvial soil	some vegetation		Crawford, I. & Wright, B.	Hand	Dry	7&frags		
117.0360				Kendrick, P.J.	Hand	Dry	3		
117.5731	Pockets of deep brown soils	Acacia Eucalypts; Ficus; mixed shrubs	Gully at base of rock face; leaf litter of 80% at 1-10cm	Clark, J.	Hand collected	Dry	2		
117.7272				MSJ, RT, ZH, SP		Wet	1	Freezer (-80C)	100% Ethanol
117.7272				MSJ, RT, ZH, SP		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7272				MSJ, RT, ZH, SP		Wet	1	Freezer (-80C)	100% Ethanol
117.4500	ploughed up in field			Tilbrook, W.J.	Hand	Dry	2		
117.7172				MSJ, RT, ZH, SP		Wet	1	Freezer (-80C)	100% Ethanol
117.7172				MSJ, RT, ZH, SP		Wet	1	Freezer (-80C)	100% Ethanol
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7185				MSJ, RT, ZH, SS, CO		Wet	1	Freezer (-80C)	100% Ethanol
117.7272				MSJ, RT, ZH, SP		Wet	1	Freezer (-80C)	100% Ethanol
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7744				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7185				MSJ, RT, ZH, SS, CO		Wet	1	Freezer (-80C)	100% Ethanol
117.7185				MSJ, RT, ZH, SS, CO		Wet	1	Freezer (-80C)	100% Ethanol
117.7453				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol

LONGDEC	SUBSTRATE	VEGETATION	HABITAT	COLLTOR	COLLMETH	STORAGE	SPECNUM	FIXED	PRESERVED
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7089				P Runham, M Greenham		Wet	1	Freezer (-80C)	100% Ethanol
117.7185				MSJ, RT, ZH, SS, CO		Wet	1	Freezer (-80C)	100% Ethanol
116.9442			ridgetop, gully sides	Leung, A.	Litter sifting	DNA	1	Not Fixed	100% Ethanol
117.5731	Pockets of deep brown soils	Acacia Eucalypts; Ficus; mixed shrubs	Gully at base of rock face; leaf litter of 80% at 1-10cm	Clark, J.	Hand collected	Dry	2		
117.4372		Mulga-Acacia sp; tall shrub over Cciliaris tussock grass	Rock gully	Kamien, D.	Soil rake&Rock turn	Dry	4		
117.5731	Pockets of deep brown soils	Acacia Eucalypts; Ficus; mixed shrubs	Gully at base of rock face; leaf litter of 80% at 1-10cm	Clark, J.	Hand collected	Dry	1		
117.7125				Biota		DNA	4	Not Fixed	100% Ethanol
117.6667	Recently burnt area			Kendrick, G.W.	Hand	Dry	1		
117.7185	Under rocks		Under rocks, cliff edge	Biota		DNA	1 juv.	Not Fixed	100% Ethanol
117.3617				RT ZH AJ		Wet	1	Not Fixed	100% Ethanol
117.3617				RT ZH AJ		Wet	1	Not Fixed	100% Ethanol
117.2717				PR EH		Wet	1	Not Fixed	100% Ethanol
117.2717				PR EH		Wet	1	Not Fixed	100% Ethanol
117.1733				RT ZH AJ		Wet	1	Not Fixed	100% Ethanol
117.1733				RT ZH AJ		Wet	1	Not Fixed	100% Ethanol
117.4992			Ridgetop	P.R. Langlands	Foraging	Dry	1		
117.5000			Midslope	P.R. Langlands	Litter sifting	Dry	1		
117.5000			Midslope	P.R. Langlands	Wet Pitfall (Prop.)	Dry	1		
117.5000			Midslope	P.R. Langlands	Litter sifting	Dry	3		
117.4856				J. Clark	opportunistic	Dry	2		
117.4787			Midslope	P.R. Langlands	Foraging	Dry	2		
117.4770					Opportunistic	Dry	3		
117.4852				J. Clark	Opportunistic	Dry	10		
117.3531				Pas, J.		Dry	5		
117.6378			leaf litter	Dight, N., West-Sooby, M.	tullgren funnel	Dry	2		
117.4734			Midslope	P.R. Langlands	Foraging	Dry	1		
117.5178				Dight, N., West-Sooby, M.	by hand	Dry	1		
117.4734			Midslope	P.R. Langlands	Foraging	Dry	1		
117.4852				J. Clark	Opportunistic	Dry	6		
117.5033				J.Clark	Opportunistic	Wet&UF	1	Not fixed	100% ethanol
117.5033				J.Clark	Opportunistic	Dry	7		
117.4697			Plain	P.R. Langlands	Foraging	Dry	8		
117.4926				J. Clark	Opportunistic	Dry	1		
117.5025				J. Clark	Opportunistic	Dry	3		
117.7089				PR MG		Wet	1	Not Fixed	100% Ethanol
117.7089				PR MG		Wet	1	Not Fixed	100% Ethanol
117.1011				RT ZH MG TS		Wet	1	Not Fixed	100% Ethanol
117.1011				RT ZH MG TS		Wet	1	Not Fixed	100% Ethanol
116.7699	sandy clay	Eucalyptus/Corymbia	plain	Phoenix	Foraging	Dry	12		
116.9151	clay loam	Eucalyptus/Corymbia	gully base	Phoenix	Foraging	Dry	1		
116.8679	clay loam	Acacia (not mulga)	gully sides	Phoenix	Litter Sifting	Dry	2		
117.2430	sandy clay	Eucalyptus/Corymbia	gully sides	Phoenix	Foraging	Dry	1		
116.8108	sandy clay	mulga	gully sides	Phoenix	Foraging	Dry	2		
117.2384	clay	Eucalyptus/Corymbia	gully sides	Phoenix	Foraging	Dry	2		
116.8679	clay loam	Acacia (not mulga)	gully sides	Phoenix	Foraging	Dry	1		
117.2044	sandy clay	Acacia (not mulga)	gully base	Phoenix	Litter Sifting	Dry	1		
117.2430	sandy clay	Eucalyptus/Corymbia	gully sides	Phoenix	Litter Sifting	Dry	1		

WAM SRE Molluscs Database Search: commissioned 1/9/2015 for Astron, between -22.203737°, 116.745811° and -22.995176°, 117.783023°

LONGDEC	SUBSTRATE	VEGETATION	HABITAT	COLLTOR	COLLMETH	STORAGE	SPECNUM	FIXED	PRESERVED
117.2044	sandy clay	Acacia (not mulga)	gully base	Phoenix	Foraging	Dry	5		
117.1605	sand	Eucalyptus/Corymbia	gully base	Phoenix	Foraging	Dry	1		
117.2766	sandy clay	mulga	plain	Phoenix	Foraging	Dry	1		
116.7699	sandy clay, loose soil, coarse gravel,	Eucalyptus/Corymbia, buffelgrass	plain	P. Langlands	Foraging	Dry	4		
117.2384	clay, coarse gravel, stones/boulders	Eucalyptus/Corymbia, spinifex	gully sides	P. Langlands	Foraging	Dry	1		
117.4957	Brown sandy clay	Eucalypt over Acacia spp; shrub over tussock-hummock grass	Plain with fine and medium gravel	Kamien, D.	Soil rake&Rock turn	Dry	1		
117.5704	sand, loose soil, gravel, rocks common	Eucalyptus/Corymbia and spinifex	south sloping gully side	E. Volschenk	Litter Sifting	Dry&U-Freeze	2&3&1	Not Fixed	100% Ethanol
117.5177	sandy loam, gravel, high rock calcrete, chirt, bif	Eucalyptus/Corymbia and spinifex	plain	E. Volschenk	Foraging	Dry&DNA	1&1	Not Fixed	100% Ethanol
117.5414	clay loam, fine gravel, coarse gravel, rocky, BIF	Eucalyptus/Corymbia	plain	E. Volschenk	Wet pit,PropG	Dry	1		
117.5696	sandy loam, fine gravel, coarse gravel, rocky, BIF	mulga	undulating plain	E. Volschenk	Foraging	Dry	1		
117.2044	sandy clay, loose soil, coarse gravel	Acacia (not mulga) and buffelgrass	gully base	P. Langlands	Litter Sifting	DNA	2		
117.0410			on access track	P. Langlands	Litter Sifting	Dry	1		
117.1216	sand, loose soil, stones/boulders	Eucalyptus/Corymbia, buffelgrass	gully base	P. Langlands	Foraging	Dry	7		
117.2766	sandy clay	mulga	plain	Phoenix	Foraging	Dry	1		
117.2044	sandy clay, loose soil, coarse gravel	Acacia (not mulga) and buffelgrass	gully base	P. Langlands	Foraging	Dry	1		
116.8924	sandy clay, coarse gravel, stones/boulders	Acacia (not mulga) and spinifex	gully base	P. Langlands	Foraging	DNA	1	Not Fixed	70% Ethanol
117.1605	sand, coarse gravel, stones/boulders	Eucalyptus/Corymbia and spinifex	gully base	P. Langlands	Foraging	Dry	1		
117.2044	sandy clay, loose soil, coarse gravel	Acacia (not mulga) and buffelgrass	gully base	P. Langlands	Foraging	Dry	1		
117.2430	sandy clay, fine and coarse gravel	Eucalyptus/Corymbia, spinifex	gully sides	P. Langlands	Foraging	Dry	3		
117.2766	sandy clay, loose soil	mulga and spinifex	plain	P. Langlands	Foraging	Dry	4		
116.9428	sandy clay, coarse gravel, stones/boulders	Eucalyptus/Corymbia and spinifex	gully base	P. Langlands	Litter Sifting	Dry	1		
116.8108	sandy clay, loose soil, coarse gravel, stones/boulders	mulga and buffelgrass	gully sides	P. Langlands	Foraging	Dry	8		
117.2766	sandy clay, loose soil	mulga and spinifex	plain	P. Langlands	Wet Pit (Prop.G)	DNA	1	Not Fixed	100% Ethanol
117.1216	sand	Eucalyptus/Corymbia	gully base	Phoenix	Foraging	Dry	4		
117.2430	sandy clay, fine and coarse gravel	Eucalyptus/Corymbia, spinifex	gully sides	P. Langlands	Foraging	DNA	1	Not Fixed	70% Ethanol
116.8057			gully sides	Leung, A.	Foraging	Dry	4		
117.5169			leaf litter	Dight, N., West-Sooby, M.	wet pitfall trap	Dry	1		
116.7725			plain	Leung, A.	Foraging	Dry	1		
116.7705			gorge base	Leung, A.	Wet pitfall	DNA	1	Propylene Glycol	100% Ethanol
117.0126			plain	Leung, A.	Foraging&Wet Pit	Dry&UF	3&1	Propylene Glycol	100% Ethanol
116.7844			plain	Leung, A.	Foraging	Dry	3		
116.8074			plain	Leung, A.	Foraging	Dry	1		
117.2461			midslope, gully sides	Leung, A.	Foraging	Dry	1		
116.7581			midslope, gully sides	Leung, A.	Foraging	Dry	2		
116.7725			plain	Leung, A.	Foraging	Dry	2		
116.9442			ridgetop, gully sides	Leung, A.	Foraging	Dry	1		
116.8007			gorge sides, gorge base	Leung, A.	Foraging	Dry	4		
116.8699			gully sides	Leung, A.	Foraging	Dry	5		
117.0667		Date Palms		Roe,R.	Hand	Dry	7		
117.6182	Loam	Mixed Acacia over Triodia	Tall shrubland	Kamien, D. & Cole, C.	Leaf litter/Rake	Dry	1		
117.5949	Clay loam	Acacia over Triodia	Open shrubland	Cole, C. & Schmidt, S.	Leaf litter/Rake	Dry	3		
117.0360				Kendrick, P.J.	Hand	Dry	8		
117.3000	Calcrete		Calcrete	Kendrick, P.J.	Hand	Dry	6		
117.4167				Kendrick, G.W.	Hand	Dry	Series		
117.6833	deep red alluvial soil, no rocks	some vegetation		Crawford,I. and Wright,B.	Hand	Dry	1		
117.6667			Recently burnt	Kendrick, G.W.	Hand	Dry	2		

LONGDEC	SUBSTRATE	VEGETATION	HABITAT	COLLTOR	COLLMETH	STORAGE	SPECNUM	FIXED	PRESERVED
117.1817				Biota Consultancy	Hand	Wet	4	Not Fixed	100% Ethanol
117.4481			Leaf litter	White, S., Leng, M.C.	Tullgren funnel	Dry	4		
117.4481			Leaf litter	White, S., Leng, M.C.	Tullgren funnel	Dry	1		
117.4481			Leaf litter	White, S., Leng, M.C.	Tullgren funnel	Dry	2		
117.4631			Leaf litter	White, S., Leng, M.C.	Tullgren funnel	Dry	1		
117.3815			Leaf litter	White, S., Leng, M.C.	Forage	Dry	29		
117.6136			Leaf litter	White, S., Leng, M.C.	Forage	Dry	1		
117.4481			Leaf litter	White, S., Leng, M.C.	Forage	Dry	1		
117.0535			gully sides	Leung, A.	Litter sifting	Dry	1		
117.6194				Dight, N., West-Sooby, M.	by hand	Dry	1		
117.5051	sandy loam, gravel,, high rock, calcrete, chirt	Eucalyptus/Corymbia and buffelgrass	footslope	E. Volschenk	Foraging	Dry	1		
117.4667			leaf litter	Dight, N., West-Sooby, M.	tullgren funnel	Dry	4		
117.5014			Plain	P.R. Langlands	Litter sifting	Dry	3		
117.5177	sandy loam, gravel, high rock calcrete, chirt, bif	Eucalyptus/Corymbia and spinifex	plain	E. Volschenk	Foraging	Dry	1		
117.5014			Plain	P.R. Langlands	Litter sifting	Dry	1		
117.5213	sandy loam, loose soil	Mulga and buffelgrass	plain	E. Volschenk	Litter Sifting	Dry	11		
117.6385	Sandy Clay;Red-brown;Surface crust; Fine gravel	Mulga;Other grasses	Floodplain	White. S, Leng. MC	leaf litter	Dry	14		
117.6194			leaf litter	Dight, N., West-Sooby, M.	tullgren funnel	Dry	1		
117.6194			leaf litter	Dight, N., West-Sooby, M.	tullgren funnel	Dry	1		
117.5721			Leaf litter	White, S., Leng, M.C.	Tullgren funnel	Dry	3		
117.6209	Cracking clays	themed(?) grassland with moderate acacia shrubs	Clacking clays		forage	Wet	6	Not Fixed	100% Ethanol

REGNO	ORDER	INFRAORDER	FAMILY	GENUS	SPECIES	SITE	COLLMETH	MALE	FEMALE
135265			Ballophilidae	Ballophilus	australiae	ca. 22km, S from Pannawonica	Litter sifting	0	0
135271			Henicopidae	Lamyctes	africanus	ca. 30km, SW from Pannawonica	Wet Pitfall (Prop.)	0	0
135272			Henicopidae	Lamyctes	africanus	ca. 30km, SW from Pannawonica	Litter sifting	0	0
135273			Henicopidae	Lamyctes	africanus	ca. 30km, SW from Pannawonica	Litter sifting	0	0
97323	Araneae	Mygalomorphae	Actinopodidae	Missulena	melissae	Millstream-Chichester National Park, 6 km N. of Millstream homestead, site PW11	ethylene glycol pits	1	0
120931	Araneae	Mygalomorphae	Actinopodidae	Missulena	melissae	Corunna Downs Station, 52.5 km N. of Nullagine, Pilbara Biological Survey site NW11	wet pit (eth.gyl)	2	0
72417	Araneae	Mygalomorphae	Actinopodidae	Missulena	`MYG040`	Warrambo, 50.5 km W. of Pannawonica, site WA3	dry pitfall traps	1	0
72418	Araneae	Mygalomorphae	Actinopodidae	Missulena	`MYG040`	Warrambo, 50.3 km W. of Pannawonica, site WA4	dry pitfall traps	2	0
118178	Araneae	Mygalomorphae	Actinopodidae	Missulena	`MYG290-DNA`	NNE. of Rocklea Homestead	Foraging	0	0
126888	Araneae	Mygalomorphae	Barychelidae	Aureocrypta	`MYG057`	ca. 7 km SW. of Pannawonica	Vert trap	1	0
126889	Araneae	Mygalomorphae	Barychelidae	Aureocrypta	`MYG057`	ca. 7 km SW. of Pannawonica	Vert trap	1	0
126890	Araneae	Mygalomorphae	Barychelidae	Aureocrypta	`MYG057`	ca. 7 km SW. of Pannawonica	Vert trap	1	0
126891	Araneae	Mygalomorphae	Barychelidae	Aureocrypta	`MYG057`	ca. 6 km SE. of Pannawonica	Vert trap	1	0
126892	Araneae	Mygalomorphae	Barychelidae	Aureocrypta	`MYG057`	ca. 7 km SW. of Pannawonica	Vert trap	1	0
126893	Araneae	Mygalomorphae	Barychelidae	Aureocrypta	`MYG057`	ca. 7 km SW. of Pannawonica	Vert trap	1	0
98886	Araneae	Mygalomorphae	Barychelidae	Aureocrypta	`MYG319-DNA`	Aquila Onslow, 63.6 km SW. of Pannawonica	dug from burrow	0	1
31138	Araneae	Mygalomorphae	Barychelidae	Synothele	`Barlee Rge sp. 1`	Barlee Range Nature Reserve, site BRNR1, Wongida Creek	dry pitfall trap	1	0
31139	Araneae	Mygalomorphae	Barychelidae	Synothele	`Barlee Rge sp. 1`	Barlee Range Nature Reserve, site BRNR1, Wongida Creek	dry pitfall trap	0	0
31140	Araneae	Mygalomorphae	Barychelidae	Synothele	`Barlee Rge sp. 1`	Barlee Range Nature Reserve, site BRNR3, Mulga Creek	dry pitfall trap	1	0
31142	Araneae	Mygalomorphae	Barychelidae	Synothele	`Barlee Rge sp. 1`	Barlee Range Nature Reserve, site BRNR12, Kookhabinna Creek Flood Plain	dry pitfall trap	1	0
56787	Araneae	Mygalomorphae	Barychelidae	Synothele	`Barlee Rge sp. 1`	Barlee Range Nature Reserve, quadrat 2	wet pitfall	1	0
97325	Araneae	Mygalomorphae	Barychelidae	Synothele	`MYG112`	19.5 km SSW. of Mt Amy, Pilbara Biological Survey site WYE07	ethylene glycol pits	3	0
103945	Araneae	Mygalomorphae	Barychelidae	Synothele	`MYG310-DNA`	API Hardey, 68.8 km SW. of Tom Price		0	0
103946	Araneae	Mygalomorphae	Barychelidae	Synothele	`MYG310-DNA`	API Hardey, 71.4 km SW. of Tom Price		0	0
103952	Araneae	Mygalomorphae	Barychelidae	Synothele	`MYG310-DNA`	API Hardey, 68.8 km SW. of Tom Price		0	0
96568	Araneae	Mygalomorphae	Barychelidae	Synothele	`MYG313-DNA`	Aquila, 51.1 km SSW. of Pannawonica	Dug from burrow	1	0
107984	Araneae	Mygalomorphae	Ctenizidae	Conothele	`MYG294-DNA`	API Hardey, 128.5 km W. of Tom Price	dug from burrow	0	1
99601	Araneae	Mygalomorphae	Ctenizidae	Conothele	`MYG298-DNA`	Emu Siding to Rosella, 82.8 km SE. of Karratha	pitfall trap	0	1
122275	Araneae	Mygalomorphae	Idiopidae	Aganippe	`MYG301-DNA`	Koodaideri Corridor West, 90.5 km NE. of Tom Price	burrow search	0	0
54390	Araneae	Mygalomorphae	Idiopidae	Aganippe	`MYG302-DNA`	Mesa K, 10 km SW. of Pannawonica (Biota site MATA11)		0	1
54389	Araneae	Mygalomorphae	Idiopidae	Euoplos	`MYG307-DNA`	Mesa A transport corridor, 27 km SW. of Pannawonica (Biota site MATA11)		0	1
54391	Araneae	Mygalomorphae	Idiopidae	Euoplos	`MYG307-DNA`	Mesa A transport corridor, 27 km SW. of Pannawonica (Biota site MATA11)		0	1

REGNO	ORDER	INFRAORDER	FAMILY	GENUS	SPECIES	SITE	COLLMETH	MALE	FEMALE
98355	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	ca. 30 km WNW. of Tom Price	dug from burrow	0	0
98423	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 5 km NW. of Tom Price	dug from burrow	1	0
98424	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 4 km NW. of Tom Price	dug from burrow	1	0
98425	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 5 km NW. of Tom Price	dug from burrow	1	0
98426	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 9 km NW. of Tom Price	dug from burrow	1	0
98427	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 4.1 km NW. of Tom Price	dug from burrow	1	0
98428	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 4 km NW. of Tom Price	dug from burrow	1	0
98429	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 9 km NW. of Tom Price	dug from burrow	1	0
98430	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 6.1 km NW. of Tom Price	dug from burrow	1	0
98431	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 9 km NW. of Tom Price	dug from burrow	1	0
98432	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 4 km NW. of Tom Price	dug from burrow	1	0
98433	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 8 km NW. of Tom Price	dug from burrow	1	0
98434	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 8 km NW. of Tom Price	dug from burrow	1	0
98435	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 4 km NW. of Tom Price	dug from burrow	1	0
98436	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price powerlines, 8 km NW. of Tom Price	dug from burrow	1	0
98437	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	West Turner Syncline, 21.5 km WNW. of Tom Price (WTS17)	pitfall trap	0	0
112542	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price Powerlines, 6.1 km NW. of Tom Price	dug from burrow	1	0
112543	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price Powerlines, 4.1 km WNW. of Tom Price	dug from burrow	1	0
112544	Araneae	Mygalomorphae	Nemesiidae	Aname	marae	Tom Price Powerlines, 4.1 km WNW. of Tom Price	dug from burrow	1	0
104453	Araneae	Mygalomorphae	Nemesiidae	Aname	`male`	21 km SSE. of Mt Amy, Pilbara Biological Survey site WYE06	wet pitfall (ethylen	1	0
102855	Araneae	Mygalomorphae	Nemesiidae	Aname	`MYG271-DNA`	Aquila, 38 km SW. of Pannawonica	dug from burrow	0	0
102859	Araneae	Mygalomorphae	Nemesiidae	Aname	`MYG271-DNA`	Aquila, 54 km SW. of Karratha	dug from burrow	0	0
102867	Araneae	Mygalomorphae	Nemesiidae	Aname	`MYG271-DNA`	Aquila, 58.1 km S. of Pannawonica	dug from burrow	0	0
122295	Araneae	Mygalomorphae	Nemesiidae	Aname	`MYG330-DNA`	Koodaideri Corridor West, 84.5 km NE. of Tom Price	burrow search	0	0
99604	Araneae	Mygalomorphae	Nemesiidae	Aname	`MYG367-DNA`	Emu Siding to Rosella, 40.4 km N. of Tom Price	pitfall trap	0	0
102864	Araneae	Mygalomorphae	Nemesiidae	Aname	`MYG369-DNA`	Aquila, 38.2 km SSE. of Pannawonica	dug from burrow	0	0
110355	Araneae	Mygalomorphae	Nemesiidae	Aname	`sp. (MYG001 group; female)`	API Hardey, 67.7 km WNW. of Paraburdoo	dug from burrow	0	1
103012	Araneae	Mygalomorphae	Nemesiidae	Aname	`sp. (MYG093 female?)`	Serenity Valley, site 6, ca. 93 km N. of Tom Price	wet pit trap	0	1
109119	Araneae	Mygalomorphae	Nemesiidae	Yilgarnia	`MYG374-DNA`	Robe Valley, 18.5 km SW. of Pannawonica		0	0
109134	Araneae	Mygalomorphae	Nemesiidae	Yilgarnia	`MYG375-DNA`	Robe Valley, 38.9 km WSW. of Pannawonica		0	0
110354	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 46.3 km WNW. of Paraburdoo	dug from burrow	0	0
110357	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 120 km WNW. of Paraburdoo	dug from burrow	0	0
110358	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 48.4 km WNW. of Paraburdoo	dug from burrow	0	0
110364	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 108 km WNW. of Paraburdoo	dug from burrow	0	0
110365	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 108 km WNW. of Paraburdoo	dug from burrow	0	0
110367	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 108 km WNW. of Paraburdoo	dug from burrow	0	0
110369	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 96.8 km WNW. of Paraburdoo	dug from burrow	0	0
110370	Araneae	Mygalomorphae	`Family indet.`	`Genus indet.`	`sp. indet. (legs)`	API Hardey, 67.7 km WNW. of Paraburdoo	under bark	0	0
71865	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP010`	Barlee Range Nature Reserve, quadrat 3	wet pitfall trap	1	0
76157	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP019 (female)`	Pilbara Survey site WYE 10, Mt Stuart Station, E. of homestead	wet pitfall traps	0	1

REGNO	ORDER	INFRAORDER	FAMILY	GENUS	SPECIES	SITE	COLLMETH	MALE	FEMALE
76143	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP023`	Pilbara Survey site PW 3, Millstream-Chichester National Park	wet pitfall traps	4	0
76150	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP023`	Pilbara Survey site PW 10, Millstream-Chichester National Park	wet pitfall traps	2	3
76148	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP024`	Pilbara Survey site PW 12, Millstream-Chichester National Park	wet pitfall traps	2	0
76149	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP024`	Pilbara Survey site PW 2, Millstream-Chichester National Park	wet pitfall traps	1	1
76153	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP024`	Pilbara Survey site PW 3, Millstream-Chichester National Park	wet pitfall traps	1	0
124597	Polydesmida		Paradoxosomatidae	Antichiropus	`DIP041`	11.5 km W. of Mt Elvire, Pilbara Biological Survey site OYE08	ethylene glycol pitf	1	2
108774	Pseudoscorpiones	Panctenata	Atemnidae	Oratemnus	`PSE031`	ca. 80 km NW. of Tom Price, bore HPRC2089, site FLI091		1	0
118239	Pseudoscorpiones	Panctenata	Chernetidae	Troglochernes		NNE. of Rocklea Homestead	Litter sifting	0	0
133468	Pseudoscorpiones		Chthoniidae	Lagynochthonius	`sp. indet.`	Nammuldi, ca. 12 km NE. of Mt Brockman	leaf litter sifting	1	0
110535	Pseudoscorpiones		Chthoniidae	Lagynochthonius	`sp. nov. Bungaroo 2`	Bungaroo, 37 km SSE. of Pannawonica, borehole BUNW01104		0	1
85807	Pseudoscorpiones		Chthoniidae	Tyrannochthonius	`bungaroo`	Bungaroo Valley, Bore BC051; ca. 38.09 km SSE. of Pannawonica		0	1
129091	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE069`	6.5 km WSW. Mt Brockman	Litter sifting	0	0
126307	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE069`	6.5 km WSW. of Mt Brockman	Litter sifting	0	1
126309	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE069`	ca. 8 km, 217° from Mt Delphine	Litter sifting	1	0
126310	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE069`	6.5 km WSW. of Mt Brockman	Litter sifting	1	1
126358	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE069`	6.5 km WSW. Mt Brockman	Litter sifting	1	1
134146	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE084`	West Turner Corridor, 23 km W. of Tom Price	under bark	0	0
102914	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE084`	Tom Price Powerlines, 6.4 km NW. of Tom Price	under bark	1	0
102930	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`PSE084`	West Turner Corridor, 23 km W. of Tom Price	under bark	0	1
73311	Pseudoscorpiones	Panctenata	Garypidae	Synsphyronus	`sp. nov. 8/1 Mt Brockman`	19 km SW. of Mount Brockman, site BRO936	pitfall	1	2
112996	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 3/1)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
112995	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
112997	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
113006	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
113030	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
113031	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
113034	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
113049	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0
127429	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. indet. (juvenile 7/3)`	Anketell Rail Corridor, NNW. Tom Price	leaf litter collecti	0	0

REGNO	ORDER	INFRAORDER	FAMILY	GENUS	SPECIES	SITE	COLLMETH	MALE	FEMALE
110536	Pseudoscorpiones	Panctenata	Olpiidae	Beierolpium	`sp. nov. Pilbara troglobite`	60 km S. of Pannawonica, borehole BQRC003		0	1
81479	Pseudoscorpiones	Hemictenata	Syarinidae	Ideoblothrus	`sp. Mesa A1`	Mesa A, near Pannawonica, borehole MEA 2988 PS T2-2		0	0
102083	Scolopendrida		Scolopendridae	Ethmostigmus	`cf. nudior`	Waramboo, 50.3 km W. of Pannawonica, (WA04)	dry pit trap	0	0
83621	Scorpiones		Buthidae	Isometroides	`sp. ?`	Mesa G, 9 km SW. of Deepdale (MEG14)	Pitfall	0	0
81692	Scorpiones		Buthidae	Lychas	`scottae?`	62.7 km S. of Pannawonica (AQM05)	pitfall	0	1
134359	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134360	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134361	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134362	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134363	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134364	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134365	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134366	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134367	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134368	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134369	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134370	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134371	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134372	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134373	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134374	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134375	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134376	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134377	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134378	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134379	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
134380	Scorpiones		Buthidae	Lychas	`splendens ms`	Solomon c.a. 40km E. Mount Mcrae	Dry pitfall	0	0
80315	Scorpiones		Buthidae	Lychas	`waramboo 1`	Waramboo, 50 km W. of Pannawonica (WAR04)	pitfall	0	1
101022	Scorpiones		Urodacidae	Urodacus	`megamastigus?`	Brockman Lease, 12.5 km SW. of Mt Brockman, site BRO10	pitfall trap	1	0
83616	Scorpiones		Urodacidae	Urodacus	`waramboo`	Waramboo, 52.1 km W. of Pannawonica (WA02)	Pitfall	2	0
83617	Scorpiones		Urodacidae	Urodacus	`waramboo`	Waramboo, 50.3 km W. of Pannawonica (WA04)	Pitfall	1	0

JUVENILE	SPECNUM	DTFR	LATDEC	LONGDEC	HABIT	DTMNDBY	COLLTOR
1	1	12/05/14	0	0		E.S. Volschenk	Dight, N.
0	2	12/05/14	0	0		E.S. Volschenk	Dight, N.
0	1	12/05/14	0	0		E.S. Volschenk	Dight, N.
0	8	12/05/14	0	0		E.S. Volschenk	Dight, N.
0	1	15/07/03	-21.5402	117.057		Miglio, L.	CALM Pilbara Survey
0	2	3/08/03	-21.4077	120.071		Miglio, L.	CALM Pilbara Survey
0	1	14/03/05	-21.6666	115.835		V.W.Framenau	Kamien, D.
0	2	14/03/05	-21.6516	115.837		V.W.Framenau	Kamien, D.
1	1	4/10/11	-22.767	117.497	Gully Base	V.W. Framenau	P.R. Langlands
0	1	10/09/12	-21.7011	116.279		V.W. Framenau	White, S.
0	1	10/09/12	-21.7011	116.279		V.W. Framenau	White, S.
0	1	10/09/12	-21.7011	116.279		V.W. Framenau	White, S.
0	1	10/09/12	-21.6609	116.371		V.W. Framenau	White, S.
0	1	10/09/12	-21.7011	116.279		Volschenk, E.S.	White, S.
0	1	10/09/12	-21.6898	116.292		V.W. Framenau	White, S.
32	33	30/10/08	-21.9453	115.801		V.W. Framenau	Kamien, D.
0	1	15/06/94	-23.0441	115.812	open Ac. citrinoviridis/Euc. terminalis	J.M.Waldock	Kendrick, P.G.; Kendrick, G.W.
0	1	15/06/94	-23.0441	115.812	open Ac. citrinoviridis/Euc. terminalis	J.M.Waldock	Kendrick, P.G.; Kendrick, G.W.
0	1	15/06/94	-23.0797	115.79	mulga woodland over Triodia	J.M.Waldock	Kendrick, P.G.; Kendrick, G.W.
0	1	19/06/94	-23.113	116.012	Acacia citrinoviridis/Euc. terminalis	J.M.Waldock	Kendrick, P.G.; Kendrick, G.W.
0	1	00/08/1993	-23.0616	115.787		J.M.Waldock	van Leeuwen, S.; Bromilow, B.
0	3	11/09/03	-22.4193	115.838		V.W. Framenau	CALM Pilbara Survey
1	1	22/07/10	-22.9681	117.18	dug from burrow	V.W.Framenau	Tatler, J.
1	1	23/07/10	-22.9667	117.159	dug from burrow	V.W.Framenau	Cartledge, V.
1	1	21/07/10	-22.9681	117.18	dug from burrow	V.W.Framenau	Tatler, J.
0	1	23/06/07	-22.0878	116.253		Framenau, V.W.	Runham, P.; Adcroft, J.
0	1	28/09/10	-22.7344	116.537		V.W.Framenau	Runham, P.; Cole, C.
0	1	6/05/08	-21.4253	117.161		V.W. Framenau	Hamilton, Z.
0	1	20/02/12	-21.8863	117.702			Cole, C.
0	1	14/11/06	-21.7294	116.259		Harvey, M.S.	Kamien, D.
0	1	19/08/06	-21.7727	116.107		Harvey, M.S.	Hamilton, Z.
0	1	19/08/06	-21.7727	116.107		Harvey, M.S.	Hamilton, Z.

JUVENILE	SPECNUM	DTFR	LATDEC	LONGDEC	HABIT	DTMNDBY	COLLTOR
1	1	22/05/11	-22.6283	117.516		Raven, R.J.	Raven, R.J.
0	1	4/09/08	-22.6767	117.739		Harvey, M.S.; et al.	Kamien, D.
0	1	6/09/09	-22.6861	117.749		Harvey, M.S.; et al.	Kamien, D.
0	1	6/09/09	-22.6767	117.739		Harvey, M.S.; et al.	Kamien, D.
0	1	6/09/09	-22.6528	117.707		Harvey, M.S.; et al.	Kamien, D.
0	1	5/09/09	-22.6861	117.749		Harvey, M.S.; et al.	Kamien, D.
0	1	5/09/09	-22.6822	117.752		V.W. Framenau	Kamien, D.
0	1	5/09/09	-22.6528	117.707		V.W. Framenau	Kamien, D.
0	1	4/09/09	-22.6689	117.748		V.W. Framenau	Kamien, D.
0	1	6/09/09	-22.6528	117.707		V.W. Framenau	Kamien, D.
0	1	5/09/09	-22.6822	117.752		V.W. Framenau	Kamien, D.
0	1	6/09/09	-22.6578	117.717		V.W. Framenau	Kamien, D.
0	1	5/09/09	-22.6578	117.717		V.W. Framenau	Kamien, D.
0	1	6/09/09	-22.6822	117.752		V.W. Framenau	Kamien, D.
0	1	6/09/09	-22.6547	117.716		V.W. Framenau	Kamien, D.
1	1	23/07/07	-22.6533	117.589		Raven, R.J.	Kamien, D.; Greenham, M.
0	1	00/09/2007	-22.6689	117.731		V.W.Framenau	Harris, E.
0	1	00/09/2007	-22.6861	117.749		V.W.Framenau	Kamien, D.
0	1	00/09/2007	-22.6861	117.749		V.W.Framenau	Kamien, D.
0	1		-22.4347	115.93		V.W.Framenau	CALM Pilbara Survey
1	1	9/09/09	-21.9344	116.13		V.W.Framenau	Runham, P.
1	1	15/09/09	-20.9633	116.391		V.W.Framenau	Runham, P.; Harris, E.
1	1	11/11/08	-22.1639	116.254		V.W.Framenau	Greenham, M
0	1	20/02/12	-21.9413	117.631			Cole, C.
1	1	6/05/09	-22.345	117.664		V.W. Framenau	Teale, R.
1	1	12/11/08	-21.9386	116.101		V.W.Framenau	Sachse, T.
0	1	23/03/10	-22.8897	117.098		V.W.Framenau	Runham, P.
0	1	25/04/10	-22.1359	117.533		V.W. Framenau	Clark, J.
1	1	24/10/10	-21.735	116.177	dug from burrow	V.W.Framenau	Teale, R.
1	1	27/10/10	-21.6594	115.949	dug from burrow	V.W.Framenau	Teale, R.
0	1	22/03/10	-22.9492	117.304			Runham, P.
0	1	23/03/10	-22.8042	116.577			Runham, P.
0	1	24/03/10	-22.9764	117.261			Sachse, T.
0	1	24/03/10	-22.8094	116.702			Runham, P.
0	1	24/03/10	-22.8094	116.702			Runham, P.
0	1	24/03/10	-22.8094	116.702			Runham, P.
0	1	25/03/10	-22.83	116.809			Runham, P.; Harris, E.
0	1	23/03/10	-22.8903	117.098			Runham, P.
1	2	00/08/1993	-23.0794	115.791		Harvey, M.S.	van Leeuwen, S.; Bromilow, B.
0	1	26/11/03	-22.43	116.28		Car, C.A.	Department of Conservation and Land Management

JUVENILE	SPECNUM	DTFR	LATDEC	LONGDEC	HABIT	DTMNDBY	COLLTOR
0	4	23/11/03	-21.3414	117.189		Car, C.A.	Department of Conservation and Land Management
0	5	23/11/03	-21.5467	117.059		Car, C.A.	Department of Conservation and Land Management
0	2	23/11/03	-21.3842	117.061		Car, C.A.	Department of Conservation and Land Management
0	2	23/11/03	-21.3281	117.243		Car, C.A.	Department of Conservation and Land Management
0	1	23/11/03	-21.3414	117.189		Car, C.A.	Department of Conservation and Land Management
0	3	2/10/05	-21.8397	116.683		Car, C.A.	CALM Pilbara Survey
0	1	24/06/10	-22.1314	117.487	subterranean	M.S.Harvey	Cocking, J.S.; Main, D.C.
1	1	5/10/11	-22.7882	117.497	Plain	Volschenk, E.S.	P.R. Langlands
0	1	12/06/14	-22.4352	117.451	hillslope/footslope	K.M.Abrams	Lloyd, R.; Maryan, B.
0	1	3/12/10	-21.9517	116.461	subterranean	M.S.Harvey	Alexander, J.; Brooshooft, P.
0	1	24/07/09	-21.9593	116.475	subterranean	Harvey, M.S.	Alexander, J.; O'Neil, C.
0	1	3/05/12	-22.4753	117.243		M.S.Harvey	Phoenix Environmental Sciences
0	1	3/05/12	-22.4753	117.243		M.S.Harvey	Phoenix Environmental Sciences
0	1	20/06/12	-22.2808	116.567		M.S.Harvey	Phoenix Environmental Sciences
1	3	3/05/12	-22.4753	117.243		M.S.Harvey	Phoenix Environmental Sciences
1	3	3/05/12	-22.4753	117.243		M.S.Harvey	Phoenix Environmental Sciences
0	1	1/09/07	-22.7106	117.561		Harvey, M.S.	Alexander, J.
0	1	1/09/07	-22.6625	117.73		Harvey, M.S.	Greenham, M.
1	2	1/09/07	-22.7106	117.561		Harvey, M.S.	Alexander, J.
0	3	21/10/04	-22.5936	117.173		Harvey, M.S.	Teale, R.
1	1	4/03/11	-21.8932	117.62	leaf litter	M.A.Burger	Dight, N.
1	1	4/03/11	-22.1824	117.7	leaf litter	M.A.Burger	Dight, N.
1	1	4/03/11	-21.8932	117.62	leaf litter	M.A.Burger	Dight, N.
1	1	4/03/11	-21.9753	117.63	leaf litter	M.A.Burger	Dight, N.
2	2	4/03/11	-21.7826	117.572	leaf litter	M.A.Burger	Dight, N.
1	1	4/03/11	-21.7826	117.572	leaf litter	M.A.Burger	Dight, N.
1	1	4/03/11	-22.1824	117.7	leaf litter	M.A.Burger	Dight, N.
1	1	4/03/11	-21.7826	117.572		M.A.Burger	Dight, N.
0	1	4/03/11	-21.7826	117.572	leaf litter	M.A.Burger	Dight, N.

JUVENILE	SPECNUM	DTFR	LATDEC	LONGDEC	HABIT	DTMNDBY	COLLTOR
0	1	5/12/10	-22.1688	116.185	subterranean	M.S.Harvey	Alexander, J.; Brooshoft, P.
1	1	6/02/07	-21.6694	115.879	subterranean	Harvey, M.S.	Kamien, D.
0	1	14/03/05	-21.6517	115.837		J.M.Waldock	Kamien, D.
1	1	13/05/04	-21.75	116.08		Volschenk, E.S.	Teale, R.
0	1	26/06/07	-22.195	116.252		Volschenk, E.S.	Runham, P.; Adcroft, J.
1	1	22/04/14	-22.0722	117.667		M.K. Curran	White, S.
1	1	22/04/14	-22.0016	118.042		M.K. Curran	White, S.
0	1	22/04/14	-22.064	117.993		M.K. Curran	White, S.
0	1	22/04/14	-22.0996	118.185		M.K. Curran	White, S.
0	1	22/04/14	-22.0863	118.108		M.K. Curran	White, S.
1	1	22/04/14	-22.0639	118.108		M.K. Curran	White, S.
1	1	22/04/14	-22.2533	117.755		M.K. Curran	White, S.
1	1	22/04/14	-22.0443	118.052		M.K. Curran	White, S.
1	1	22/04/14	-22.0996	118.185		M.K. Curran	White, S.
2	2	22/04/14	-22.0639	118.108		M.K. Curran	White, S.
0	1	22/04/14	-22.1472	118.173		M.K. Curran	White, S.
1	1	22/04/14	-22.0642	117.993		M.K. Curran	White, S.
1	2	22/04/14	-22.0021	118.041		M.K. Curran	White, S.
1	1	22/04/14	-22.0647	118.108		M.K. Curran	White, S.
1	1	22/04/14	-22.2534	117.755		M.K. Curran	White, S.
0	1	22/04/14	-22.0864	118.109		M.K. Curran	White, S.
1	1	22/04/14	-22.0646	117.994		M.K. Curran	White, S.
0	1	22/04/14	-22.0996	118.185		M.K. Curran	White, S.
1	2	22/04/14	-22.0016	118.042		M.K. Curran	White, S.
1	1	22/04/14	-22.0634	118.108		M.K. Curran	White, S.
0	1	22/04/14	-22.0639	118.108		M.K. Curran	White, S.
0	1	22/04/14	-22.0639	118.108		M.K. Curran	White, S.
0	1	19/08/06	-21.6516	116.837		Volschenk, E.S.	Beesley, L.
0	1	13/04/05	-22.5617	117.242		Volschenk, E.S.	Hamilton, Z.; Kamien, D.
0	2	14/03/05	-21.6636	115.819		Volschenk, E.S.	Kamien D. (Biota)
1	2	14/03/05	-21.6516	115.837		Volschenk, E.S.	Kamien D. (Biota)

REMARKS	ACCDT	SNAME	FLDNO
WAMTS356;	14/04/15	Phoenix	16492
WAMTS356;	14/04/15	Phoenix	17222
WAMTS356;	14/04/15	Phoenix	17278
WAMTS356;	14/04/15	Phoenix	17287
DEC Pilbara survey, sp. 200; = `MYG 110`	8/06/09	DEC	
= `MYG 110`	6/12/12	DEC	
	30/03/06	Biota	WA03-8
	30/03/06	Biota	WA04-4
	1/10/13	Phoenix	PE11:4806
	18/11/13	Ecologia	EE12:0629
	18/11/13	Ecologia	EE12:0616
	18/11/13	Ecologia	EE12:0607
	18/11/13	Ecologia	EE12:0606
	18/11/13	Ecologia	EE12:0622
	18/11/13	Ecologia	EE12:0595
leg and all spiderlings in 100%EtOH (three vials)	21/10/09	Biota	M20081030AQOoppDK-1
	16/08/94	Kendrick	
pedipalps & first legs missing	16/08/94	Kendrick	
	16/08/94	Kendrick	
	16/08/94	Kendrick	
	20/02/04	Van Leeuwen	
DEC Pilbara survey, sp. 38	9/06/09	DEC	
WAM106; leg in 100% ETOH	14/09/10	Biota	M20100722.AQH08-01
WAM106; leg in 100% ETOH	14/09/10	Biota	M20100723.AQHSRE29-01
WAM106; leg in 100% ETOH	14/09/10	Biota	M20100721.AQH08-01
	25/03/09	Biota	M20070627.AQMHar01-1
WAM149; leg in 100% ETOH	23/11/10	Biota	M20100928.AQHSRE51-03
leg in 100%EtOH, possibly immature	16/12/09	Biota	M20080506.PIXMYG01-01
WAMTS027; leg in 100%ETOH; ARC Rix DNA;	16/04/12	Biota	M20120225.KDW34A-01
leg in 100% EtOH; ARC Rix DNA;	4/06/08	Biota	
leg in 100% EtOH; ARC Rix DNA;	4/06/08	Biota	
leg in 100% EtOH	4/06/08	Biota	

REMARKS	ACCDT	SNAME	FLDNO
in 100% EtOH	17/06/11	Raven	WTS4
leg in 100%EtOH	8/09/09	Biota	M20080904.TPP08-1
leg in 100%EtOH	8/09/09	Biota	M20080906.TPP10-1
leg in 100%EtOH	8/09/09	Biota	M20080906.TPP08-1
leg in 100%EtOH	8/09/09	Biota	M20080906.TPP01-2
leg in 100%EtOH	8/09/09	Biota	M20080905.TPP10-1
leg in 100%EtOH	8/09/09	Biota	M20080905.TPP09-1
leg in 100%EtOH	8/09/09	Biota	M20080905.TPP01-1
leg in 100%EtOH	8/09/09	Biota	M20080904.TPP07-1
leg in 100%EtOH	8/09/09	Biota	M20080906.TPP01-1
leg in 100%EtOH	8/09/09	Biota	M20080905.TPP09-2
leg in 100%EtOH	8/09/09	Biota	M20080906.TPP03-1
leg in 100%EtOH	8/09/09	Biota	M20080905.TPP03-1
leg in 100%EtOH	8/09/09	Biota	M20080906.TPP09-1
leg in 100%EtOH	8/09/09	Biota	M20080906.TPP02-1
penultimate female	8/09/09	Biota	M20070723.WTS17-1
pedipalp in micro-vial	23/05/11	Biota	M20070921TPP07
pedipalp in micro-vial; 1 left leg in 100% EtOH	23/05/11	Biota	M20070920TPP10-1
pedipalp in micro-vial; 1 left leg in 100% EtOH	23/05/11	Biota	M20070919TPP10-1
Pilbara Biological Survey	2/12/10	DEC	
leg in 100% EtOH	19/07/10	Biota	M20090909APISRE01PR-01
leg in 100% EtOH	19/07/10	Biota	M20090909AQD18-01
leg in 100% EtOH	19/07/10	Biota	M20081111OPPMG-01
WAMTS027; leg in 100%ETOH	16/04/12	Biota	M20120226.KDW31A-01
leg in 100%EtOH	16/12/09	Biota	M20080506.PIX03-01
leg in 100% EtOH	19/07/10	Biota	M20081112AQARL08-01
WAM166; leg in 100% EtOH	8/03/11	Biota	M20100323.AQH10F.GH-01
WAM118	9/08/10	Phoenix	949-124
WAM158; leg in 100%ETOH	11/01/11	Biota	M20101024RVM16E-03
WAM158; leg in 100%ETOH	11/01/11	Biota	M20101027RVM02-04
WAM166; leg in 100% EtOH	8/03/11	Biota	M20100322.AQH05-01
WAM166; legs in 100% EtOH	8/03/11	Biota	M20100323.AQH16TS-01
WAM166; legs in 100% EtOH	8/03/11	Biota	M20100324.AQH07-1
WAM166; legs in 100% EtOH	8/03/11	Biota	M20100324.AQH15-3
WAM166; legs in 100% EtOH	8/03/11	Biota	M20100324.AQH15-4
WAM166; legs in 100%ETOH	8/03/11	Biota	M20100324.AQH15-6
WAM166; leg in 100%ETOH	8/03/11	Biota	M20100325.AQH13-01
WAM166; legs in 100%ETOH	8/03/11	Biota	M20100323.AQH10F-01
originally tagged A. `BR1`	15/03/06	van Leeuwen	
CALM Pilbara Survey: originally tagged `A. mt stuart`	18/07/06	CALM	

REMARKS	ACCDT	SNAME	FLDNO
CALM Pilbara Survey: originally tagged `A. millstream`	18/07/06	CALM	
CALM Pilbara Survey: originally tagged `A. millstream`	18/07/06	CALM	
CALM Pilbara Survey: originally tagged `A. pilbara`	18/07/06	CALM	
CALM Pilbara Survey: originally tagged `A. pilbara`	18/07/06	CALM	
CALM Pilbara Survey: originally tagged `A. pilbara`	18/07/06	CALM	
CALM Pilbara Survey: originally tagged `A.elvire`	26/07/12	CALM	OYE08
right legs I-IV in 100% EtOH; troglobitic; was previously known as `sp. nov. Tom Price` blue tissue box labelled `Pseudos for Mieke` in pseudo freezer	17/11/10	Bennelongia	
	1/10/13	Phoenix	PE11:1690
WAMTS318; ex T133241	17/07/14	Biologic	09-RIOBr-T1-L-1373
in 100% EtOH	14/01/11	Biota	BUNWO1104P9-01
Greater Bungaroo Stygofauna Project	4/08/09	Biota	
in 100% EtOH; Field No: [999-E7-T1-LS]; tritonymph	23/08/12	Phoenix	PE12:6251
in 100% EtOH; legs taken for NCB DNA project; Field No: [999-E7-T1-LS]	23/08/12	Phoenix	PE12:6279
in 100% EtOH; Field No: [999-D08-T2-LS]; legs taken for NCB DNA project	23/08/12	Phoenix	PE12:7593
in 100% EtOH; Field No: [999-E7-T1-LS]; tritonymph	23/08/12	Phoenix	PE12:6251
Field No: [999-E7-T1-LS]; tritonymph; previously ex T126310 extracted DNA using ANDE and sequenced for Co1; Ecologica DNA Barcoding Project 2013	23/08/12	Phoenix	PE12:6251
Previously `sp. West Turner 8/3`; legs taken for NCB project	28/01/15	Biota	P20070920WTC12
in 100% EtOH (badly damaged, no pedipalps); Previously `sp. West Turner 8/3`	19/07/10	Biota	P20070922TPP10-1
Previously `sp. West Turner 8/3`	19/07/10	Biota	P20070920WTC12
	18/04/06	Biota	
WAM177; protonymph; Ecologia DNA Barcoding 2013	2/06/11	Ecologia	1326; 10:1382
WAM177; 100%EtOH; tritonymph	24/05/11	Ecologia	1326; 10:1380
WAM177; tritonymph; Ecologia DNA Barcoding 2013	24/05/11	Ecologia	1326; 10:1383
WAM177; tritonymph; Ecologia DNA Barcoding 2013	2/06/11	Ecologia	1326; 10:1394
WAM177; 100% EtOH; 2 tritonymphs	2/06/11	Ecologia	1326; 10:1658
WAM177; tritonymph; Ecologia DNA Barcoding 2013	2/06/11	Ecologia	1326; 10:1661
WAM177; tritonymph; Ecologia DNA Barcoding 2013	2/06/11	Ecologia	1326; 10:1667
WAM177; tritonymph; Ecologia DNA Barcoding 2013	2/06/11	Ecologia	1326; 10:1999
WAM177; 100% EtOH; 2 tritonymphs	2/06/11	Ecologia	1326; 10:1658

REMARKS	ACCDT	SNAME	FLDNO
in 100% EtOH	14/01/11	Biota	BQRC003P9T2-02
tritonymph	5/07/07	Biota	
	14/05/10	Biota	WA04-10
	18/12/07	Biota	
	11/12/07	Runham	
WAMTS337; 1594	17/11/14	Ecologia	13;1510
WAMTS337; 1594	17/11/14	Ecologia	13;1512
WAMTS337; 1594	17/11/14	Ecologia	13;5571
WAMTS337; 1594	17/11/14	Ecologia	13;5572
WAMTS337; 1594	17/11/14	Ecologia	13;5575
WAMTS337; 1594	17/11/14	Ecologia	13;5580
WAMTS337; 1594	17/11/14	Ecologia	13;5602
WAMTS337; 1594	17/11/14	Ecologia	13;5609
WAMTS337; 1594	17/11/14	Ecologia	13;5621
WAMTS337; 1594	17/11/14	Ecologia	13;5624
WAMTS337; 1594	17/11/14	Ecologia	13;5630
WAMTS337; 1594	17/11/14	Ecologia	13;5637
WAMTS337; 1594	17/11/14	Ecologia	13;5641
WAMTS337; 1594	17/11/14	Ecologia	13;5656
WAMTS337; 1594	17/11/14	Ecologia	13;5657
WAMTS337; 1594	17/11/14	Ecologia	13;5659
WAMTS337; 1594	17/11/14	Ecologia	13;5675
WAMTS337; 1594	17/11/14	Ecologia	13;5676
WAMTS337; 1594	17/11/14	Ecologia	13;5678
WAMTS337; 1594	17/11/14	Ecologia	13;5683
WAMTS337; 1594	17/11/14	Ecologia	13;5686
WAMTS337; 1594	17/11/14	Ecologia	13;5612
	22/05/07	Biota	
	7/04/10	Biota	BRO10-21
	18/12/07	Kamien	
	18/12/07	Kamien	

Appendix 2

Licence To Take Fauna



DEPARTMENT OF PARKS AND WILDLIFE



Department of
Parks and Wildlife



Enquiries:
Telephone:
Facsimile:

17 DICK PERRY AVE, KENSINGTON, WESTERN AUSTRALIA
08 9219 9000
08 9219 8242

Correspondence:

Locked Bag 30
Bentley Delivery Centre WA 6983

PAGE NO. 1
PERSON NO. SF010431
70754

RECEIPT NO. AMOUNT
\$0.00

WILDLIFE CONSERVATION ACT 1950 REGULATION 17

LICENCE TO TAKE FAUNA FOR SCIENTIFIC PURPOSES

THE UNDERMENTIONED PERSON MAY TAKE FAUNA FOR RESEARCH OR OTHER SCIENTIFIC PURPOSES AND WHERE AUTHORISED, KEEP IT IN CAPTIVITY, SUBJECT TO THE FOLLOWING AND ATTACHED CONDITIONS, WHICH MAY BE ADDED TO, SUSPENDED OR OTHERWISE VARIED AS CONSIDERED FIT.

DIRECTOR GENERAL

CONDITIONS

- 1 The licensee shall comply with the provisions of the Wildlife Conservation Act 1950, Wildlife Conservation Regulations 1970 and any notices in force under this legislation.
- 2 Unless specifically authorised in the Conditions of this Licence or otherwise in writing by the Director General, species of fauna declared as likely to become extinct, rare or otherwise in need of special protection shall not be captured or otherwise taken.
- 3 No fauna shall be taken from any Nature Reserve, National Park, Marine Park, Marine Nature Reserve, Timber Reserve or State Forest without prior written approval of the Director General. No fauna shall be taken from any other public land without the written approval of the Government Authority managing that land.
- 4 No entry or collection of fauna to be undertaken on any private property or pastoral lease without the consent in writing of the owner or occupier, or from any Aboriginal lands without the written approval of the Department of Aboriginal Affairs.
- 5 No fauna or their progeny shall be released in any area where it does not naturally occur, nor be handed over to any other person or authority unless approved by the Director General, nor shall the remains of such fauna be disposed of in such manner as to confuse the natural or present day distribution of the species.
- 6 This licence and the written permission referred to at conditions 3 & 4 must be carried by the licensee or authorised agent at all times for the purpose of proving their authority to take fauna when questioned as to their right to do so by a Wildlife Officer, any other State or Local Government employee or any member of the public.
- 7 Any interaction involving Gazetted Threatened Fauna that may be harmful and/or invasive may require approval from the Department of the Environment ph 02 6274 1111. Interaction with such species is controlled by the Commonwealth Government's "Environment Protection and Biodiversity Conservation Act 1999" and "Environment Protection and Biodiversity Conservation Regulations 2000" as well as this Department's Wildlife Conservation Act 1950 and Wildlife Conservation Regulations 1970.
- 8 No bioprospecting involving the removal of sample aquatic and terrestrial organisms (both flora and fauna) for chemical extraction and bioactivity screening is permitted to be conducted without specific written approval by the Director General.
- 9 Further conditions are attached.

DEPARTMENT OF PARKS AND WILDLIFE



Department of Parks and Wildlife



Enquiries:
Telephone:
Facsimile:

17 DICK PERRY AVE, KENSINGTON, WESTERN AUSTRALIA
08 9219 9000
08 9219 8242

Correspondence:

Locked Bag 30
Bentley Delivery Centre WA 6983

PAGE
NO.
PERSON NO.

2
SF010431
70754

PURPOSE

LEVEL 2 VERTEBRATE FAUNA SURVEY AND SHORT RANGE ENDEMIC (SRE) INVERTEBRATE FAUNA SURVEY BY SYSTEMATIC TRAPPING (CAGE, ELLIOTT, FUNNEL AND DRY PITFALL TRAPS), CONSERVATION SIGNIFICANT FAUNA HABITAT ASSESSMENT (NORTHERN QUOLL (DASYURUS HALLUCATUS), PILBARA OLIVE PYTHON (LIASIS OLIVACEUS BARRONI), ORANGE LEAF-NOSED BAT (RHINONICTERIS AURANTIA), GHOST BAT (MACRODERMA GIGAS)), TARGETED SEARCHES, SECONDARY EVIDENCE, AVIFAUNA SURVEYS, MOTION SENSITIVE REMOTE CAMERAS, CAVE INSPECTIONS, ECHOLOCATION RECORDERS, HARP TRAPS (BY SUITABLY EXPERIENCED PERSONS), SPOTLIGHTING AND HEAD-TORCHING, AND OPPORTUNISTIC OBSERVATIONS AT THE BROCKMAN SYNCLINE 4 MARRA MAMBAS PROJECT AREA, 60KM NORTHWEST OF TOM PRICE, FOR RIO TINTO. POTENTIAL SRE INVERTEBRATES MAY BE RETAINED AS VOUCHER SPECIMENS FOR SPECIES IDENTIFICATION.

AUTHORISED PERSONS

- ROY TEALE
- GARTH HUMPHREYS
- MICHAEL GREENHAM
- DANIEL KAMIEN
- JASON ALEXANDER
- TIM SACHSE
- JESSICA CAIRNES
- PENNY BROOSHOOFT
- DAVID KEIRLE
- CHRIS COLE
- NICOLA WATSON
- SYLVIE SCHMIDT
- STEWART FORD
- JACINTA KING
- MICHAEL DELANEY
- ANDREW SHEPPARD
- SCOTT WERNER
- JUSTIN FAIRHEAD

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VALID FROM 30/07/2015
DATE OF EXPIRY 10/08/2015


LICENSING OFFICER

RESIDENTIAL ADDRESS: 6A WONGAN AVE
WHITEGUM VALLEY WA 6162

LICENSEE: MR D KAMIEN
ADDRESS C/- BIOTA ENVIRONMENTAL
PO BOX 155
LEEDERVILLE WA 6903

(DANIEL)



WILDLIFE CONSERVATION REGULATIONS 1970

Regulation 17:- Licence to Take Fauna for Scientific Purposes

FURTHER CONDITIONS (OF LICENCE NUMBER SF 010431)

1. The licensee shall take fauna only in the manner stated on the endorsed Regulation 17 licence application form and endorsed related correspondence.
2. Except in the case of approved lethal traps, the licensee shall ensure that measures are taken in the capture and handling of fauna to prevent injury or mortality resulting from that capture or handling. Where traps or other mechanical means or devices are used to capture fauna these shall be deployed so as to prevent exposure of trapped animals to ants and debilitating weather conditions and inspected at regular intervals throughout each day of their use. At the conclusion of research all markers etc and signs erected by the licensee and all traps shall be removed, all pitfalls shall be refilled or capped and the study area returned to the condition it was in prior to the research/capture program. During any break in research, cage traps should be removed and pitfalls either removed, capped or filled with sand.
3. No collecting is to be undertaken in areas where it would impinge on pre-existing scientific research programs.
4. Any form of colour marking of birds or bats shall only be undertaken in accordance with the requirements of the Australian Bird and Bat Banding Scheme.
5. Any inadvertently captured specimen of fauna which is declared as likely to become extinct, rare or otherwise in need of special protection is to be released immediately at the point of capture. Where such a specimen is injured or deceased, the licensee shall contact Department of Parks and Wildlife licensing staff at Kensington (08 9219 9831) for advice on disposal. Records are to be kept of any fauna so captured and details included in the report required under further condition 6 below.
6. Within one month of the expiration of this licence, the holder shall submit an electronic return detailing the locality, site, geocode, date and number of each species captured, sighted or vouchered during the currency of the licence, into the Department of Parks and Wildlife Fauna Survey Database (FSD). A copy of any paper, report or thesis resulting from the research shall on completion be lodged with the Director General. If a renewal of this licence is required, the licensee shall submit a written progress report for activities undertaken during this licence period prior to the expiry of this licence.
7. Not more than ten specimens of any one protected species shall be taken and removed from any location less than 20km apart. Where exceptional circumstances make it necessary to take large series in order to obtain adequate statistical data the collector will proceed with circumspection and justify their actions to the Director General in advance.
8. All holotypes and syntypes and a half share of paratypes of species or subspecies permitted to be permanently taken under this licence shall be donated to the Western Australian Museum. Duplicates (one pair in each case) of any species collected which represents a significant extension of geographic range shall be donated on request to the Western Australian Museum.
9. To prevent any unnecessary collecting in this State, all specimens and material collected under the authority of this license shall, on request, be loaned to the Western Australian Museum. Also, the unused portion or portions of any specimen collected under the authority of this license shall be offered for donation to the Western Australian Museum or made available to other scientific workers if so required.

Appendix 3

Echolocation Survey of Bat Activity



**Marra mamba fauna survey
Pilbara WA,
August 2015**

Echolocation Survey of Bat Activity.

Prepared for Biota Environmental Sciences

Bat Call WA Pty Ltd
ABN 26 146 117 839
43 Murray Drive
Hillarys Western Australia 6025
bullen2@bigpond.com
+61 8 9402 1987
+61 488 930 735

Prepared by:
R. D. Bullen – Bat Call WA
Issue A
30 August 2015

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Document Revision History

Date	Issue	Revision History
30 Aug 2015	A	Initial draft prepared for Biota

Summary

Microbat species presence, with an estimate of activity level, is presented for five sites at “Marra Mamba” in the Pilbara, WA. Biota Environmental Sciences carried out an echolocation based survey in August 2015. Bat Call WA has reviewed the recordings made and provided species lists for the bats present.

Nine species of echolocating microbats were recorded including the Orange Leaf-nosed Bat, Pilbara form (*Rhynonictoris aurantia*) (PLNb) and the Ghost Bat (*Macroderma gigas*).

Habitats

Sites were chosen by Biota. Details of the sites are presented in Table 1. Two sites are at cave entrances, two are at breakaways and two are in gorges, one dry and one with pools present. The locations of the sites are shown in relation to the locality’s features in Figure 1.

Characteristics of the calls recorded are presented in Table 2.

Bat Fauna

A microbat assemblage of nine insectivorous species was confirmed as present at the study sites, Tables 2 and 3. Species activity levels were low to high, which is expected for the study area habitat and the time of year, see criteria below.

PLNb were detected at four sites, Table 3 and figure 1, all at low activity levels. The maximum number of calls in a night was 25 at site ’93-02 on the 7th August. The earliest and latest calls detected were at 18:50 at site ’81-02 and 04:13 at site ’54-01 respectively. The timing and activity levels at all sites indicate PLNb foraging away from a roost site.

Taxonomy presented herein is after Jackson and Groves (2015).

Survey Timing, Moon Phase and Weather

The survey was conducted between 2nd and 7th August 2015. Sampling evenings were warm and dry with minimum overnight temperatures around 15^oC. The moon in this period was at third quarter. These conditions correspond to high levels of bat echolocation detection for the season.

Survey Team

A team of Biota ecologists conducted the bat sampling work. Bob Bullen of Bat Call WA completed analysis of echolocation recordings.

Sampling

The survey consisted of successfully completing a total of fifteen overnight bat sound recordings, beginning at twilight, at five locations within the survey area. The detector at site ’93-01 failed to record. The recordings were “continuous” (Hyder *et al.* 2010) made using a SM2BAT SongMeter (Wildlife Acoustics Inc, USA). The jumper and audio settings used for the SM2BAT followed the manufacturer’s recommendations for bat detection contained in the user manual (Wildlife Acoustics 2010). Selectable filters and triggers were also set using the manufacturer’s recommendations, see also Table 4. Table 2 provides details of the methods used by date and site.

For the recordings, once reformatted as .wav files, COOL EDIT 2000 (Now available as AUDITION from Adobe Systems Inc.) was used to display each sequence for identification. Calls were identified manually. Only good quality call sequences were used. Details of calls analysed are provided in Table 2 as recommended by Australasian Bat Society (ABS 2006). Reference data for the species identified are available in Bullen and McKenzie 2002, McKenzie and Bullen 2003 and McKenzie and Bullen 2009.

Bat activity was then characterised as “Low”, “Medium” or “High” based on the rate of call sequences recorded.

- Low species activity is referred when a species is recorded with call spacing less often than ten minutes,
- Medium species activity refers to call recordings more often than 10 minutes but less often than two minutes apart for a at least an hour followed by sporadic records for the remainder of the session.
- High species activity refers to call recording more often than two minutes apart for at least two hours followed by reasonably regular records for the remainder of the session.

Survey Limitations

The sites surveyed were accessible on foot and the SM2, using an omnidirectional microphone, was set on the ground with the microphone horizontal. Species are unlikely to be under-represented as a result.

Bat species density away from cave or adit entrances is impossible to estimate from echolocation records. Bat activity is therefore substituted as an approximate guide to the relative numbers of each species using the study area.

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- Jackson, S. and Groves, C (2015). Taxonomy of Australian Mammals. CSIRO Publishing: Collingwood Vic.
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- Reardon, T.B., McKenzie, N.L., Cooper, S.J., Appleton, B. Carthew, S. and Adams, M. (2014). A molecular and morphological investigation of species boundaries and phylogenetic relationships in Australian free-tailed bats Mormopterus (Chiroptera: Molossidae). *Australian Journal of Zoology*, available on-line 23 April 2014.
- Wildlife Acoustics (2010). Song Meter User Manual, Model SM2, with Song Meter SM2BAT 192kHz Stereo or 384kHz Mono Ultrasonic Recorders addendum.

Table 1. Site Specific details.

Site	Date	Recording Time	Habitat	Easting	Northing
MAMbat93-01	2-4 August	No recordings made.	Cave entrance	537648	7502527
MAMbat93-02	5-7 August	Three overnight recordings using SM2	Breakaway overlooking large open drainage	539744	7502995
MAMbat54-01	2-4 August	Three overnight recordings using SM2	Gorge site	536638	7501259
MAMbat54-02	5-7 August	Three overnight recordings using SM2	Breakaway facing front of ranges	537390	7504049
MAMbat81-01	2-4 August	Three overnight recordings using SM2	Cave entrance	536762	7501671
MAMbat81-02	5-7 August	Three overnight recordings using SM2	Pool in large gorge	535680	7501063

Table 2: Summary of Echolocation call characteristics for microbat species present.

Genus species Authority	Common name	Typical F_{peakC} kHz	Ave. Q	Typical Duration msec	Typical Call Shape
<i>Chaerephon jobensis</i> (Miller 1902)	Northern free-tailed bat	22	5	8 - 15	Shallow FM
<i>Chalinolobus gouldii</i> (Grey 1841)	Gould's wattled bat	32	10	7 - 11	FM
<i>Macroderma gigas</i> (Dobson 1880)	Ghost bat	20 – 52 variable	2 – 20 variable	variable	Complex FM
<i>Ozimops lumsdenae</i> Reardon <i>et al.</i> 2014	Northern free-tailed bat	26	10	8 - 13	Shallow FM
<i>Rhinonicteris aurantia</i> (Gray 1845)	Pilbara leaf-nosed bat	120	30	5 - 8	CF
<i>Scotorepens greyii</i> (Gray 1843)	Little broad-nosed bat	38	10	7 - 13	FM
<i>Taphozous georgianus</i> Thomas 1915	Common sheath-tailed bat	24.5	14	9 - 18	CF– shallow FM
<i>Taphozous hilli</i> Thomas 1915	Hills sheath-tailed bat	26	14	9 - 18	CF– shallow FM
<i>Vespadelus finlaysoni</i> (Kitchener, Jones and Caputi 1987)	Inland cave bat	55	14	4 - 8	FM

Note 1: F_{peakC} and Q are defined in McKenzie and Bullen 2003, 2009.

Note 2: *O. lumsdenae* has recent synonyms of *M. beccarii* (historical)and *M. lumsdenae* (after a recent reclassification of Australian *Mormopterus* species by Reardon *et al.* (2014)).

Table 3. Microbat lists obtained presented by site.

Site	<i>Chaerephon jobensis</i>	<i>Chalinolobus gouldii</i>	<i>Macroderma gigas</i>	<i>Ozimops lumsdenae</i>	<i>Rhinonictes aurantia</i>	<i>Scotorepens greyii</i>	<i>Taphozous georgianus</i>	<i>Taphozous hillii</i>	<i>Vespadelus finlaysoni</i>
MAMbat93-01 Note 1									
MAMbat93-02	Low	High	Low (1 call)	High	Low (38 calls)	Med	Low		High
MAMbat54-01	Low	Low		Low	Low (4 calls)	Low	High		High
MAMbat54-02	Low	Low		Low			Low	Low	Low
MAMbat81-01	Low	Low			Low (2 calls)	Low	High		Low
MAMbat81-02	Low	High		Med	Low (7 calls)	High	Med		High

Note 1: Detector failed to record at this site.

Note 2: R. aurantia and M. gigas call totals are totals for the three nights.

Table 4 SM2 Audio settings used during survey.

Parameter	Setting
Sample rate	384,000 kHz
Channel used	Left
Compression protocol	WAC2 (14 bit audio samples)
Gain - left channel	0.00
Digital high pass filter Left channel	fs/48 (giving 8 kHz minimum frequency)
Digital low pass filter Left channel	Off
Triggering level Left channel	6SNR (adaptive +6 dB triggering)
Triggering window Left channel	1.0 sec.

Note: These settings are as recommended in Wildlife Acoustics (2010) except the high pass filter. This is set lower to 8kHz to record any *Tadarida australis* that may be present

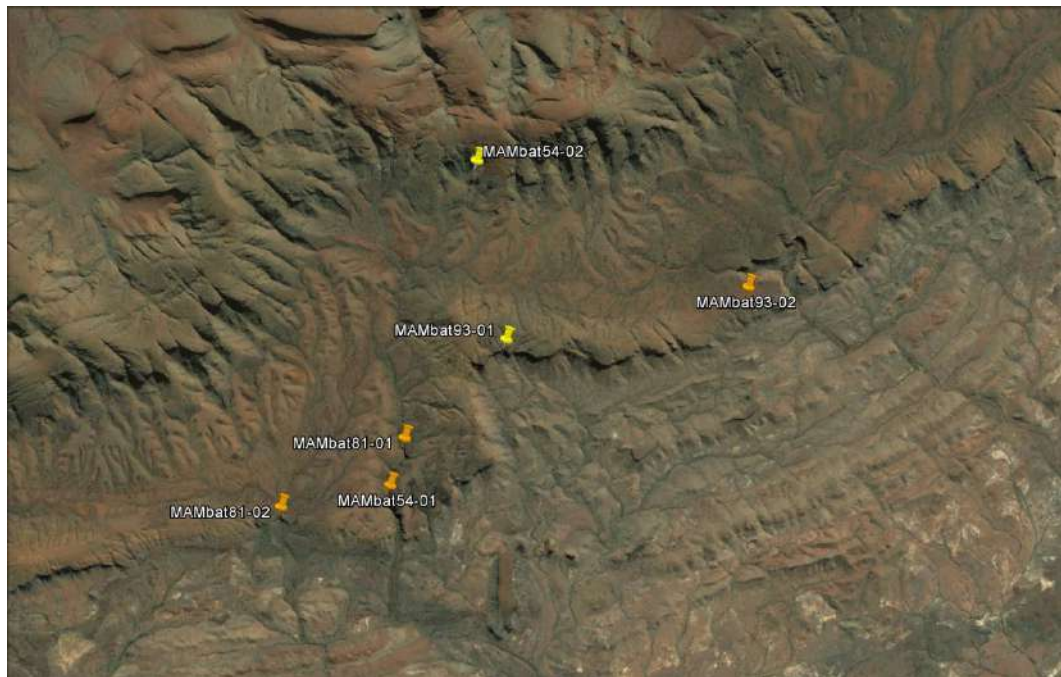


Figure 1. Detector Sites in relation to features in the study area. Orange pins denote sites where PLNb were detected

Appendix 4

Potential Species List for the Study Area Based on the Desktop Review



Family	Species Name	Common Name	Conservation Status	NatureMap	ALA	EPBC	Biota 2005	Biota 2009	Biota 2013a	Biota 2013b	Biota 2014	Astron 2014	This Study
Carphodactylidae	<i>Nephurus wheeleri</i>			.	.								
Diplodactylidae	<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko		.	.		.						.
Diplodactylidae	<i>Diplodactylus savagei</i>	Southern Pilbara Beak-faced Gecko		.	.		.	.
Diplodactylidae	<i>Lucasium stenodactylum</i>			.	.		.	.
Diplodactylidae	<i>Lucasium wombeyi</i>			.	.		.	.
Diplodactylidae	<i>Oedura marmorata</i>	Marbled Velvet Gecko		.	.			.					.
Diplodactylidae	<i>Rhynchoedura ornata</i>	Western Beaked Gecko		.	.		.						
Diplodactylidae	<i>Strophurus elderi</i>			.	.		.						
Diplodactylidae	<i>Strophurus wellingtonae</i>			.	.		.						
Gekkonidae	<i>Gehyra pilbara</i>			.	.								
Gekkonidae	<i>Gehyra punctata</i>			.	.		.	.					.
Gekkonidae	<i>Gehyra variegata</i>			.	.		.	.					.
Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's Gecko		.	.		.	.
Gekkonidae	<i>Heteronotia spelea</i>	Pilbara Cave Gecko		.	.			.					
Pygopodidae	<i>Delma elegans</i>			.	.								
Pygopodidae	<i>Delma nasuta</i>			.	.		.						.
Pygopodidae	<i>Delma pax</i>			.	.		.						
Pygopodidae	<i>Delma tincta</i>			.	.		.						.
Pygopodidae	<i>Lialis burtonis</i>			.	.		.						.
Pygopodidae	<i>Pygopus nigriceps</i>			.	.		.						
Agamidae	<i>Amphibolurus longirostris</i>			.	.		.	.		.			.
Agamidae	<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon		.	.		.	.	.			.	.
Agamidae	<i>Ctenophorus isolepis</i>	Military Dragon		.	.		.	.
Agamidae	<i>Ctenophorus nuchalis</i>	Central Netted Dragon		.	.								
Agamidae	<i>Ctenophorus reticulatus</i>	Western Netted Dragon		.	.								.
Agamidae	<i>Diporiphora amphiboluroides</i>	Mulga Dragon		.	.								
Agamidae	<i>Diporiphora valens</i>	Southern Pilbara Tree Dragon		.	.		.						
Agamidae	<i>Pogona minor</i>			.	.								.
Agamidae	<i>Tympanocryptis cephalus</i>	Pebble Dragon		.	.								
Egerniidae	<i>Cyclodomorphus melanops</i>	Slender Blue-tongue		.	.		.	.
Egerniidae	<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink		.	.								
Egerniidae	<i>Egernia formosa</i>			.	.		.	.	.				.
Egerniidae	<i>Tiliqua multifasciata</i>	Central Blue-tongue		.	.								
Eugongylidae	<i>Carlia munda</i>			.	.			.					.
Eugongylidae	<i>Carlia triacantha</i>			.	.			.					.
Eugongylidae	<i>Cryptoblepharus buchananii</i>			.	.								.
Eugongylidae	<i>Cryptoblepharus plagiocephalus</i>			.	.		.						
Eugongylidae	<i>Cryptoblepharus ustulatus</i>			.	.			.					.
Eugongylidae	<i>Menetia greyii</i>			.	.		.						.
Eugongylidae	<i>Menetia surda</i>			.	.		.						
Eugongylidae	<i>Morethia ruficauda</i>			.	.		.	.					.
Eugongylidae	<i>Proablepharus reginae</i>			.	.								
Sphenomorphidae	<i>Ctenotus auricola</i>			.	.		.			.			.
Sphenomorphidae	<i>Ctenotus grandis</i>			.	.		.	.					.
Sphenomorphidae	<i>Ctenotus hanloni</i>			.	.								
Sphenomorphidae	<i>Ctenotus helenae</i>			.	.		.	.
Sphenomorphidae	<i>Ctenotus leonhardii</i>			.	.								.
Sphenomorphidae	<i>Ctenotus pantherinus</i>	Leopard Ctenotus		.	.		.	.					.
Sphenomorphidae	<i>Ctenotus robustus</i>			.	.								
Sphenomorphidae	<i>Ctenotus rubicundus</i>			.	.			.					
Sphenomorphidae	<i>Ctenotus rufilans</i>			.	.		.	.

Family	Species Name	Common Name	NatureMap	ALA	Biota 2005	Biota 2009	Biota 2013a	Biota 2013b	Biota 2014	This study
Hylidae	<i>Cyclorana maini</i>	Sheep Frog	•	•	•		•			
Hylidae	<i>Litoria rubella</i>	Little Red Tree Frog	•		•	•				•
Myobatrachidae	<i>Uperoleia russelli</i>	Northwest Toadlet	•	•						
Myobatrachidae	<i>Uperoleia saxatilis</i>	Pilbara Toadlet	•	•						

Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon	Schedule 7		•								
Rallidae	<i>Tribonyx ventralis</i>	Black-tailed Native-hen			•								
Rallidae	<i>Fulica atra</i>	Eurasian Coot			•								
Otididae	<i>Ardeotis australis</i>	Australian Bustard		•	•		•						•
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew		•	•								
Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt			•								
Charadriidae	<i>Charadrius veredus</i>	Oriental Plover	Schedule 5			•							
Charadriidae	<i>Elseyonis melanops</i>	Black-fronted Dotterel		•	•								
Charadriidae	<i>Erythronyx cinctus</i>	Red-kneed Dotterel		•									
Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	Schedule 2				•						
Scolopacidae	<i>Gallinago megala</i>	Swinhoe's Snipe	Schedule 5			•							
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	Schedule 5			•							
Turnicidae	<i>Turnix velox</i>	Little Button-quail		•	•		•	•					•
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah		•	•		•	•				•	•
Cacatuidae	<i>Cacatua sanguinea</i>	Little Corella		•	•		•						
Cacatuidae	<i>Nymphicus hollandicus</i>	Cockatiel		•	•		•						•
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck		•	•		•					•	•
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar		•	•		•	•					•
Psittacidae	<i>Neopsephotus bourkii</i>	Bourke's Parrot			•								
Psittacidae	<i>Neophema elegans</i>	Elegant Parrot			•								
Cuculidae	<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo		•	•		•	•					•
Cuculidae	<i>Chalcites osculans</i>	Black-eared Cuckoo			•								
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo		•	•		•						•
Strigidae	<i>Ninox connivens</i>	Barking Owl		•	•								
Strigidae	<i>Ninox novaeseelandiae</i>	Southern Boobook		•	•			•				•	•
Tytonidae	<i>Tyto javanica</i>	Eastern Barn Owl			•								
Halcyonidae	<i>Dacelo leachii</i>	Blue-winged Kookaburra		•	•		•	•					
Halcyonidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		•	•		•	•					•
Halcyonidae	<i>Todiramphus sanctus</i>	Sacred Kingfisher		•	•							•	
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	Schedule 5	•	•	•		•					•
Climacteridae	<i>Climacteris melanura</i>	Black-tailed Treecreeper		•	•								
Ptilonorhynchidae	<i>Ptilonorhynchus guttatus</i>	Western Bowerbird		•	•		•					•	•
Maluridae	<i>Malurus leucopterus</i>	White-winged Fairy-wren	Schedule 3	•	•		•						
Maluridae	<i>Malurus lamberti</i>	Variiegated Fairy-wren	Schedule 3	•	•		•	•				•	•
Maluridae	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren		•	•		•						•
Maluridae	<i>Amytornis striatus</i>	Striated Grasswren		•	•		•						
Acanthizidae	<i>Pyrrholaemus brunneus</i>	Redthroat		•	•								
Acanthizidae	<i>Smicromis brevirostris</i>	Weebill		•	•		•	•				•	•
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone		•	•			•					•
Acanthizidae	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill		•	•								
Acanthizidae	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		•	•		•	•					
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill		•	•		•						
Acanthizidae	<i>Aphelocephala nigrincincta</i>	Banded Whiteface		•									
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote		•	•		•	•					•
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote		•	•		•	•				•	
Meliphagidae	<i>Certhionyx variegatus</i>	Pied Honeyeater		•									
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater			•		•	•				•	•
Meliphagidae	<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater			•		•	•				•	•

Family	Species	Common Name	Conservation Listing	NatureMap	ALA	EPBC	Biota 2005	Biota 2009	Biota 2013a	Biota 2013b	Biota 2014	Astron 2014	RioTinto 2008	This Study
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna		•	•			•						
Dasyuridae	<i>Dasykaluta rosamondae</i>	Little Red Kaluta		•	•									
Dasyuridae	<i>Dasyurus hallucatus</i>	Northern Quoll	Schedule 2			•								
Dasyuridae	<i>Ningauia timealeyi</i>	Pilbara Ningauia		•	•		•	•						•
Dasyuridae	<i>Planigale ingrami</i>	Long-tailed Planigale		•				•						•
Dasyuridae	<i>Planigale maculata</i>	Common Planigale		•										
Dasyuridae	<i>Pseudantechinus roryi</i>	Rory's Pseudantechinus		•					•					
Dasyuridae	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus		•	•									•
Dasyuridae	<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart	Priority 4	•	•									
Dasyuridae	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart		•	•			•						•
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby, Dalgyte	Schedule 3			•								
Notoryctidae	<i>Notoryctes caurinus</i>	Northern Marsupial Mole	Priority 4			•								
Macropodidae	<i>Osphranter robustus</i>	Euro		•			•	•			•	•		
Macropodidae	<i>Osphranter rufus</i>	Red Kangaroo, Marlu		•						•				•
Muridae	<i>Leggadina lakedownensis</i>	Short-tailed Mouse	Priority 4	•	•			•						
Muridae	<i>Mus musculus</i>	House Mouse		•	•	•	•	•						•
Muridae	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	Priority 4	•	•					•	•	•	•	•
Muridae	<i>Pseudomys desertor</i>	Desert Mouse		•	•		•							•
Muridae	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse		•	•		•	•						•
Muridae	<i>Zyomys argurus</i>	Common Rock-rat		•	•		•	•	•					
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit				•								
Rhinonictidae	<i>Rhinonictis aurantia</i>	Pilbara Leaf-nosed Bat	Schedule 3			•		•			•			•
Megadermatidae	<i>Macroderma gigas</i>	Ghost Bat	Schedule 3	•										•
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tailed Bat		•						•				
Emballonuridae	<i>Taphozous georgianus</i>	Common Sheath-tailed Bat		•	•		•	•		•				•
Emballonuridae	<i>Taphozous hilli</i>	Hill's Sheath-tailed Bat		•	•									•
Molossidae	<i>Austronomus australis</i>	White-striped Free-tailed Bat					•	•						
Molossidae	<i>Chaerephon jobensis</i>	Greater Northern Free-tailed Bat		•						•				•
Molossidae	<i>Ozimops cobourgiensis</i>	Northern Coastal Free-tailed Bat					•							
Molossidae	<i>Ozimops lumsdenae</i>	Northern Free-tailed bat		•	•									•
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		•	•		•	•	•					•
Vespertilionidae	<i>Nyctophilus arnhemensis</i>	Arnhem Long-eared Bat					•							
Vespertilionidae	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat		•										
Vespertilionidae	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat		•										
Vespertilionidae	<i>Scotorepens greyii</i>	Little Broad-nosed Bat		•			•	•	•					•
Vespertilionidae	<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat		•	•		•	•	•					•
Canidae	<i>Canis dingo</i>	Dingo		•			•							•
Canidae	<i>Canis familiaris</i>	Dog		•		•				•				
Canidae	<i>Vulpes vulpes</i>	Red Fox				•								
Felidae	<i>Felis catus</i>	Cat		•		•	•							
Equidae	<i>Equus asinus</i>	Donkey		•		•								
Equidae	<i>Equus caballus</i>	Horse				•								
Bovidae	<i>Bos taurus</i>	European Cattle		•						•				•

Order	Family	Species	ALA	Biota 2005	Biota 2009	Biota 2013
ARANEAE	Actinopodidae	<i>Missulena</i> sp.	•			
ARANEAE	Barychelidae	<i>Aurecocypta</i> sp.	•			
ARANEAE	Barychelidae	<i>Idiommata</i> sp.	•			
ARANEAE	Barychelidae	<i>Synothele karara</i>	•			
ARANEAE	Ctenizidae	<i>Conothele</i> sp.	•			
ARANEAE	Nemesiidae	<i>Aname marae</i>	•			
ARANEAE	Nemesiidae	<i>Aname mellosa</i>	•			
ARANEAE	Nemesiidae	<i>Kwonkan</i> sp.	•			
ARANEAE	Nemesiidae	<i>Aname</i> sp. 'N126'				•
ARANEAE	Nemesiidae	<i>Aname</i> sp. 'N19'				•
PSEUDOSCORPIONES	Chernetidae	<i>Haplochernes</i> sp.	•			
PSEUDOSCORPIONES	Chernetidae	<i>Nesidiochernes</i> sp.	•			
PSEUDOSCORPIONES	Chernetidae	<i>Troglochernes</i> sp.	•			
PSEUDOSCORPIONES	Chthoniidae	<i>Austrochthonius</i> sp.	•			
PSEUDOSCORPIONES	Chthoniidae	<i>Tyrannochthonius</i> sp.	•			
PSEUDOSCORPIONES	Garypidae	<i>Synsphyronus heptatrachus</i>	•			
PSEUDOSCORPIONES	Garypidae	<i>Synsphyronus</i> sp.	•			
PSEUDOSCORPIONES	Hyidae	<i>Indohya</i> sp.	•			
PSEUDOSCORPIONES	Olpidae	<i>Austrohorus</i> sp.	•			•
PSEUDOSCORPIONES	Olpidae	<i>Beierolpium</i> sp.	•			
PSEUDOSCORPIONES	Olpidae	<i>Euryolpium</i> sp.	•			
PSEUDOSCORPIONES	Olpidae	<i>Indolpium</i> sp.	•			•
PSEUDOSCORPIONES	Sternophoridae	<i>Afrosterophorus</i> sp.	•			
SCORPIONES	Buthidae	<i>Lychas</i> sp.	•			
SCORPIONES	Urodacidae	<i>Urodacus megamastigus</i>	•			
STYLOMMATOPHORA	Camaenidae	<i>Quistrachia</i> sp.		•	•	•
STYLOMMATOPHORA	Camaenidae	<i>Rhagada</i> sp.		•	•	
STYLOMMATOPHORA	Camaenidae	<i>Rhagada</i> sp. 'Beasley'				•
STYLOMMATOPHORA	Camaenidae	<i>Rhagada</i> sp. 'Panna'				•
STYLOMMATOPHORA	Camaenidae	<i>Rhagada</i> sp. 'Tom Price'				•

Appendix 5

Species Recorded by the 2015 Survey: Site by Species Matrices



Family	Species	Common Name	Conservation Listing	NatureMap	ALA	EPBC	Biota 2005	Biota 2009	Biota 2013a	Biota 2013b	Biota 2014	Astron 2014	RioTinto 2008	This Study
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna		•	•			•						
Dasyuridae	<i>Dasykaluta rosamondae</i>	Little Red Kaluta		•	•									
Dasyuridae	<i>Dasyurus hallucatus</i>	Northern Quoll	Schedule 2			•								
Dasyuridae	<i>Ningauia timealeyi</i>	Pilbara Ningauia		•	•		•	•						•
Dasyuridae	<i>Planigale ingrami</i>	Long-tailed Planigale		•				•						•
Dasyuridae	<i>Planigale maculata</i>	Common Planigale		•										
Dasyuridae	<i>Pseudantechinus roryi</i>	Rory's Pseudantechinus		•					•					
Dasyuridae	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus		•	•									•
Dasyuridae	<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart	Priority 4	•	•									
Dasyuridae	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart		•	•			•						•
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby, Dalgyte	Schedule 3			•								
Notoryctidae	<i>Notoryctes caurinus</i>	Northern Marsupial Mole	Priority 4			•								
Macropodidae	<i>Osphranter robustus</i>	Euro		•			•	•			•	•		
Macropodidae	<i>Osphranter rufus</i>	Red Kangaroo, Marlu		•						•				•
Muridae	<i>Leggadina lakedownensis</i>	Short-tailed Mouse	Priority 4	•	•			•						
Muridae	<i>Mus musculus</i>	House Mouse		•	•	•	•	•						•
Muridae	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	Priority 4	•	•					•	•	•	•	•
Muridae	<i>Pseudomys desertor</i>	Desert Mouse		•	•		•							•
Muridae	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse		•	•		•	•						•
Muridae	<i>Zyomys argurus</i>	Common Rock-rat		•	•		•	•	•					
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit				•								
Rhinonictidae	<i>Rhinonictis aurantia</i>	Pilbara Leaf-nosed Bat	Schedule 3			•		•			•			•
Megadermatidae	<i>Macroderma gigas</i>	Ghost Bat	Schedule 3	•										•
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tailed Bat		•						•				
Emballonuridae	<i>Taphozous georgianus</i>	Common Sheath-tailed Bat		•	•		•	•		•				•
Emballonuridae	<i>Taphozous hilli</i>	Hill's Sheath-tailed Bat		•	•									•
Molossidae	<i>Austronomus australis</i>	White-striped Free-tailed Bat					•	•						
Molossidae	<i>Chaerephon jobensis</i>	Greater Northern Free-tailed Bat		•						•				•
Molossidae	<i>Ozimops cobourgianus</i>	Northern Coastal Free-tailed Bat					•							
Molossidae	<i>Ozimops lumsdenae</i>	Northern Free-tailed bat		•	•									•
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		•	•		•	•	•					•
Vespertilionidae	<i>Nyctophilus arnhemensis</i>	Arnhem Long-eared Bat					•							
Vespertilionidae	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat		•										
Vespertilionidae	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat		•										
Vespertilionidae	<i>Scotorepens greyii</i>	Little Broad-nosed Bat		•			•	•	•					•
Vespertilionidae	<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat		•	•		•	•	•					•
Canidae	<i>Canis dingo</i>	Dingo		•			•							•
Canidae	<i>Canis familiaris</i>	Dog		•		•				•				
Canidae	<i>Vulpes vulpes</i>	Red Fox				•								
Felidae	<i>Felis catus</i>	Cat		•		•	•							
Equidae	<i>Equus asinus</i>	Donkey		•		•								
Equidae	<i>Equus caballus</i>	Horse				•								
Bovidae	<i>Bos taurus</i>	European Cattle		•						•				•

Herpetofauna

Family	Species	Common name	Site									Opportunis	Total	
			MAM01P	MAM02P	MAM03P	MAM04P	MAM05P	MAM06F	MAM07F	MAM08E	MAM09E			
Agamidae	<i>Amphibolurus longirostris</i>					2							1	3
Agamidae	<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon		2		2				1				5
Agamidae	<i>Ctenophorus reticulatus</i>	Western Nettle Dragon	1											1
Agamidae	<i>Pogona minor</i>			1		2								3
Boidae	<i>Antaresia stimsoni</i>	Stimson's Python											1	1
Diplodactylidae	<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko			1									1
Diplodactylidae	<i>Oedura marmorata</i>	Marbled Velvet Gecko										4		4
Egerniidae	<i>Egernia formosa</i>											1		1
Elapidae	<i>Demansia rufescens</i>	Rufous Whipsnake								1				1
Elapidae	<i>Parasuta monachus</i>		1											1
Elapidae	<i>Pseudonaja mengdeni</i>	Western Brown Snake								1				1
Elapidae	<i>Suta fasciata</i>	Rosen's Snake					1	1						2
Eugongylidae	<i>Carlia munda</i>					1								1
Eugongylidae	<i>Carlia triacantha</i>						1			1				2
Eugongylidae	<i>Cryptoblepharus buchananii</i>							2						2
Eugongylidae	<i>Cryptoblepharus ustulatus</i>												1	1
Eugongylidae	<i>Menetia greyii</i>						1							1
Eugongylidae	<i>Morethia ruficauda</i>												1	1
Gekkonidae	<i>Gehyra punctata</i>											14		14
Gekkonidae	<i>Gehyra variegata</i>							1						1
Hylidae	<i>Litoria rubella</i>											2		2
Pygopodidae	<i>Delma nasuta</i>			1										1
Pygopodidae	<i>Delma tincta</i>							1						1
Pygopodidae	<i>Lialis burtonis</i>									2				2
Sphenomorphidae	<i>Ctenotus duricola</i>				2	1								3
Sphenomorphidae	<i>Ctenotus grandis</i>			1	1	1				2				5
Sphenomorphidae	<i>Ctenotus leonhardii</i>												1	1
Sphenomorphidae	<i>Ctenotus pantherinus</i>	Leopard Ctenotus	2	1				1	2	2				8
Sphenomorphidae	<i>Ctenotus saxatilis</i>	Rock Ctenotus		1						6				7
Varanidae	<i>Varanus bushi</i>	Pilbara Mulga Goanna		1										1
Varanidae	<i>Varanus tristis tristis</i>	Racehorse Goanna								1			1	2
		Total	4	8	4	9	5	6	17	0	21	6	80	

Avifauna

Family	Species	Common name	Site									Opportunistics	Total	
			MAM01P	MAM02P	MAM03P	MAM04P	MAM05P	MAM06F	MAM07F	MAM08E	MAM09E			
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon			2	3	19	1						25
Columbidae	<i>Geophaps plumifera</i>	Spinifex Pigeon			1	2	12	1			2	1		19
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove				2	2	2						6
Eurostopodidae	<i>Eurostopodus argus</i>	Spotted Nightjar											1	1
Accipitridae	<i>Elanus axillaris</i>	Black-shouldered Kite			1									1
Accipitridae	<i>Milvus migrans</i>	Black Kite			1									1
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel	1				1							2
Falconidae	<i>Falco berigora</i>	Brown Falcon		1	1									2
Ofiidae	<i>Ardeotis australis</i>	Australian Bustard											2	2
Turnicidae	<i>Turnix velox</i>	Little Button-quail				2								2
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah	1		4	36	8	20		2				71
Cacatuidae	<i>Nymphicus hollandicus</i>	Cockatiel							2					2
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck		1	1		1				1		3	7
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar			22	11	22	5					21	81
Cuculidae	<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo	1		1	2		1	2			1		8
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo	4											4
Strigidae	<i>Ninox novaeseelandiae</i>	Southern Boobook										1	2	3
Halcyonidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher										1		1
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater			1									1
Ptilonorhynchidae	<i>Ptilonorhynchus guttatus</i>	Western Bowerbird										1		1
Maluridae	<i>Malurus lamberti</i>	Variiegated Fairy-wren			11	13	6	3						33
Maluridae	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren				4								4
Acanthizidae	<i>Smicromis brevirostris</i>	Weebill	4	12				2		2				20
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone			3			3						6
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote		1										1
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater	3	3	5	5	2	3		1	4			26
Meliphagidae	<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater	8	6	1	2		3	12	12	5			49
Meliphagidae	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater							2					2
Meliphagidae	<i>Manorina flavigula</i>	Yellow-throated Miner		5			9	15			2			31
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			2									2
Meliphagidae	<i>Epthianura tricolor</i>	Crimson Chat	2		6			4						12
Meliphagidae	<i>Sugomel niger</i>	Black Honeyeater	2		1	1			1					5
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler				3								3
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	2	1			5				2			10
Campephagidae	<i>Lalage sueurii</i>	White-winged Triller	6											6
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler	1	5				1	2	2				11
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	1	1					2	2	1			7
Pachycephalidae	<i>Oreoica gutturalis</i>	Crested Bellbird	4	2	3	2	3	2	2	1				19
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow	1		5	6								12
Artamidae	<i>Artamus minor</i>	Little Woodswallow		1					8	2	4			15
Artamidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird					3				1			4
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail	2	2	2				10	5	4			25
Corvidae	<i>Corvus orru</i>	Torresian Crow									2			2
Monarchidae	<i>Grallina cyanoleuca</i>	Maggpie-lark			1			1						2
Petroicidae	<i>Melanodryas cucullata</i>	Hooded Robin	4			1			3					8
Megaluridae	<i>Eremionis carteri</i>	Spinifexbird		1	1	1	1	1	1	2				8
Nectariniidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird										2		2
Estrilidae	<i>Taeniopygia guttata</i>	Zebra Finch		3	26	31	24	3		7	9			103
Estrilidae	<i>Emblema pictum</i>	Painted Finch		4	10		6		2	3	8			33
	Total		47	49	112	127	124	71	49	43	50	29		701

Appendix 6

Total Species List for the Study Area Based on All Sampling to Date



Herpetofauna

Family	Common Name	Species	Current Survey	Previous Surveys
Diplodactylidae	<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko	•	
Diplodactylidae	<i>Oedura marmorata</i>	Marbled Velvet Gecko	•	
Diplodactylidae	<i>Lucasium stenodactylum</i>			•
Diplodactylidae	<i>Rhynchoedura ornata</i>	Western Beaked Gecko		•
Diplodactylidae	<i>Strophurus elderi</i>			•
Diplodactylidae	<i>Diplodactylus savagei</i>	Southern Pilbara Beak-faced Gecko		•
Gekkonidae	<i>Gehyra variegata</i>		•	•
Gekkonidae	<i>Gehyra punctata</i>		•	
Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's Gecko		•
Pygopodidae	<i>Delma nasuta</i>		•	•
Pygopodidae	<i>Lialis burtonis</i>		•	•
Pygopodidae	<i>Delma tincta</i>		•	•
Pygopodidae	<i>Delma pax</i>			•
Agamidae	<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon	•	•
Agamidae	<i>Pogona minor</i>		•	•
Agamidae	<i>Amphibolurus longirostris</i>		•	
Agamidae	<i>Ctenophorus reticulatus</i>	Western Netted Dragon	•	
Agamidae	<i>Ctenophorus isolepis</i>	Military Dragon		•
Egerniidae	<i>Egernia formosa</i>		•	
Egerniidae	<i>Cyclodomorphus melanops</i>	Slender Blue-tongue		•
Eugongylidae	<i>Carlia munda</i>		•	•
Eugongylidae	<i>Menetia greyii</i>		•	•
Eugongylidae	<i>Carlia triacantha</i>		•	
Eugongylidae	<i>Cryptoblepharus buchananii</i>		•	
Eugongylidae	<i>Cryptoblepharus ustulatus</i>		•	
Eugongylidae	<i>Morethia ruficauda</i>		•	
Eugongylidae	<i>Menetia surda</i>			•
Sphenomorphidae	<i>Ctenotus duricola</i>		•	•
Sphenomorphidae	<i>Ctenotus grandis</i>		•	•
Sphenomorphidae	<i>Ctenotus leonhardii</i>		•	

Herpetofauna

Family	Common Name	Species	Current Survey	Previous Surveys
Sphenomorphidae	<i>Ctenotus pantherinus</i>	Leopard Ctenotus	•	•
Sphenomorphidae	<i>Ctenotus saxatilis</i>	Rock Ctenotus	•	
Sphenomorphidae	<i>Ctenotus helenae</i>			•
Sphenomorphidae	<i>Ctenotus rutilans</i>			•
Sphenomorphidae	<i>Ctenotus schomburgkii</i>			•
Sphenomorphidae	<i>Lerista muelleri</i>			•
Varanidae	<i>Varanus bushi</i>	Pilbara Mulga Goanna	•	
Varanidae	<i>Varanus tristis</i>	Racehorse Goanna	•	
Varanidae	<i>Varanus acanthurus</i>	Spiny-tailed Goanna		•
Varanidae	<i>Varanus panoptes</i>	Yellow-spotted Goanna		•
Typhlopidae	<i>Anilius grypus</i>			•
Typhlopidae	<i>Anilius pilbarensis</i>			•
Boidae	<i>Antaresia stimsoni</i>	Stimson's Python	•	
Elapidae	<i>Demansia rufescens</i>	Rufous Whipsnake	•	
Elapidae	<i>Parasuta monachus</i>		•	•
Elapidae	<i>Pseudonaja mengdeni</i>	Western Brown Snake	•	
Elapidae	<i>Suta fasciata</i>	Rosen's Snake	•	
Elapidae	<i>Furina ornata</i>	Moon Snake		•
Elapidae	<i>Pseudechis australis</i>	Mulga Snake		•
Hylidae	<i>Litoria rubella</i>	Little Red Tree Frog	•	
Hylidae	<i>Cyclorana maini</i>	Sheep Frog		•

Birds

Family	Species	Common Name	Current Survey	Previous Surveys
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu		•
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing		•
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon	•	•
Columbidae	<i>Geophaps plumifera</i>	Spinifex Pigeon	•	
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove	•	•
Eurostopodidae	<i>Eurostopodus argus</i>	Spotted Nightjar	•	
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift		•
Accipitridae	<i>Elanus axillaris</i>	Black-shouldered Kite	•	
Accipitridae	<i>Milvus migrans</i>	Black Kite	•	
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel	•	
Falconidae	<i>Falco berigora</i>	Brown Falcon	•	•
Otididae	<i>Ardeotis australis</i>	Australian Bustard	•	
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew		•
Turnicidae	<i>Turnix velox</i>	Little Button-quail	•	
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah	•	•
Cacatuidae	<i>Nymphicus hollandicus</i>	Cockatiel	•	
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck	•	
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar	•	•
Cuculidae	<i>Chalcites basalus</i>	Horsfield's Bronze-Cuckoo	•	
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo	•	•
Strigidae	<i>Ninox novaeseelandiae</i>	Southern Boobook	•	
Halcyonidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher	•	•
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	•	•
Ptilonorhynchidae	<i>Ptilonorhynchus guttatus</i>	Western Bowerbird	•	•
Maluridae	<i>Malurus lamberti</i>	Variiegated Fairy-wren	•	•
Maluridae	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren	•	•
Acanthizidae	<i>Smicronis brevirostris</i>	Weebill	•	•
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone	•	
Acanthizidae	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		•
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote	•	
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote		•
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater	•	•
Meliphagidae	<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater	•	•
Meliphagidae	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	•	•
Meliphagidae	<i>Manorina flavigula</i>	Yellow-throated Miner	•	•
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	•	•
Meliphagidae	<i>Epthianura tricolor</i>	Crimson Chat	•	
Meliphagidae	<i>Sugomel niger</i>	Black Honeyeater	•	
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill		•
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	•	•
Campephagidae	<i>Coracina maxima</i>	Ground Cuckoo-shrike		•
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	•	•
Campephagidae	<i>Lalage sueurii</i>	White-winged Triller	•	•
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler	•	•
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	•	•
Pachycephalidae	<i>Oreoica gutturalis</i>	Crested Bellbird	•	•

Birds

Family	Species	Common Name	Current Survey	Previous Surveys
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow	•	•
Artamidae	<i>Artamus minor</i>	Little Woodswallow	•	•
Artamidae	<i>Cracticus torquatus</i>	Grey Butcherbird		•
Artamidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird	•	•
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail	•	•
Corvidae	<i>Corvus orru</i>	Torresian Crow	•	•
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark	•	•
Petroicidae	<i>Melanodryas cucullata</i>	Hooded Robin	•	•
Megaluridae	<i>Eremiornis carteri</i>	Spinifexbird	•	•
Hirundinidae	<i>Petrochelidon ariel</i>	Fairy Martin		•
Nectariniidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird	•	•
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch	•	•
Estrildidae	<i>Emblema pictum</i>	Painted Finch	•	•

Mammals

Family	Species	Common Name	Current Survey	Previous Surveys
Dasyuridae	<i>Ningauai timealeyi</i>	Pilbara Ningauai	•	•
Dasyuridae	<i>Planigale ingrami</i>	Long-tailed Planigale	•	
Dasyuridae	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus	•	
Dasyuridae	<i>Sminthopsis macroura</i>	Froggatt's Stripe-faced Dunnart	•	
Macropodidae	<i>Osphranter robustus</i>	Euro, Biggada		•
Macropodidae	<i>Osphranter rufus</i>	Red Kangaroo, Marlu	•	
Macropodidae	<i>Petrogale rothschildi</i>	Rothschild's Rock-wallaby		•
Muridae	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	•	
Muridae	<i>Pseudomys desertor</i>	Desert Mouse	•	
Muridae	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	•	•
Muridae	<i>Mus musculus</i>	House Mouse	•	
Rhinonictoridae	<i>Rhinonictoris aurantia</i>	Pilbara Leaf-nosed Bat	•	
Megadermatidae	<i>Macroderma gigas</i>	Ghost Bat	•	
Emballonuridae	<i>Taphozous georgianus</i>	Common Sheath-tailed Bat	•	
Emballonuridae	<i>Taphozous hilli</i>	Hill's Sheath-tailed Bat	•	
Molossidae	<i>Chaerephon jobensis</i>	Greater Northern Free-tailed Bat	•	
Molossidae	<i>Ozimops lumsdenae</i>	Northern Free-tailed Bat	•	
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	•	•
Vespertilionidae	<i>Scotorepens greyii</i>	Little Broad-nosed Bat	•	•
Vespertilionidae	<i>Vespadelus finlaysoni</i>	Finlayson's Cave-bat	•	•
Canidae	<i>Canis dingo</i>	Dingo	•	
Bovidae	<i>Bos taurus</i>	European Cattle	•	

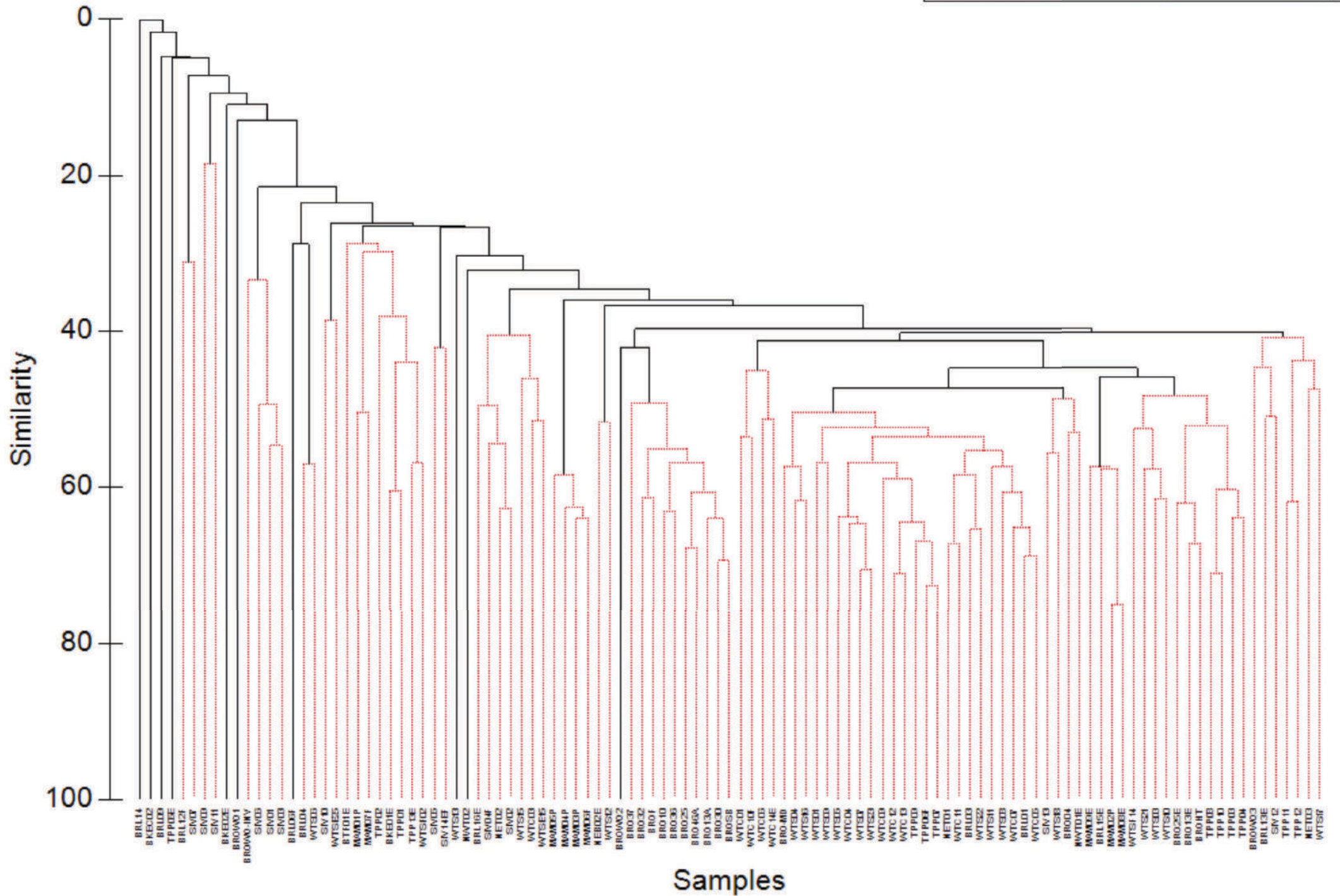
Appendix 7

Assemblage Analysis Dendrograms



Group average

Transform: Square root
Resemblance: S17 Bray Curtis similarity



Group average

Transform: Square root
Resemblance: S17 Bray Curtis similarity

